ENCE
RARY
TN
60
.93

Geo

BT

NEW YORK • LONDON

WORLD PETROLEUM

Authentic Story of Iraq Oil • The Struggle for Possession of the Field • Evolution of Iraq Petroleum Company and Terms of Its Revised Concession • Construction of the Great Pipeline • Present Status of Work • B.O.D. Will Develop West of Tigris

SEPTEMBER • 1932

FIFTY CENTS OR TWO SHILLINGS THE COPY

Science Library

TN
860
.W93

DOING THE JOB
THE WORLD OVER
SINCE 1919

Service

In every high pressure service condition the world over, — the largest oil producing wells, the largest gassers, the highest field pressure lines and the most severe steam pressure and high temperature refinery service, — you will always find KEROTEST rendering 100% service. This consistent, highly satisfactory performance has built up a background of —

Experience

that is second to none. KEROTEST gave the first cast steel high pressure valves to the world, and has always built them to a quality standard. In every North and South American oil field pipe line, in Roumania, Iraq, Persia, India, Borneo, Sumatra, Russia — in fact in every important development of the past decade, KEROTEST performance has conclusively demonstrated ability to produce a product unsurpassed for every oil field and refinery service.

Confidence

Therefore, with KEROTEST products on your lines — you *know* they have been proved by years of engineering and field experience under every service condition, — that they have withstood every oil field test, — that they are rendering highly satisfactory service throughout the world, — why you can always specify and recommend KEROTEST with *confidence*.

Do you have your copy of the latest Kerotest Catalogue?

KEROTEST MFG. CO.
PITTSBURGH, PENNA.

KEROTEST
REGISTERED U. S. PAT. OFF.
VALVES • FITTINGS

Carried in stock and sold by
OILWELL
SUPPLY COMPANY
Stores in Every Field

SEPTEMBER
1932

WORLD PETROLEUM

(Incorporating "Petroleum Equipment Exporter")

VOLUME III — EDITOR, E. W. MAYO — NUMBER 9

CONTENTS

Frontispiece 352
Editorial 353
Foreign Oil Legion 392
Production 401
Finance 403

Special Articles

Iraq Oil—An Expression of International Cooperation 355
Terms of Iraq Company's Contract 360
Bringing Iraq Oil to the Mediterranean 362
Geological Features of Iraq Fields 367
Economic Aspects of Iraq Development 369
Present Status of Iraq Construction Work 373
B. O. D. to Develop Second Iraq Field 377
Modern Alchemy in Petroleum Refining 381
World Consumption Balances Production in 1931 385
Germany—Oil Resources and Oil Market 389

PUBLISHED MONTHLY BY

RUSSELL PALMER

153 Waverly Place, New York, U. S. A.

Telephone: CHelsea 2—7398 Cable Address; to expedite delivery over direct wire address cables RUSPAM WUX NEW YORK and telegrams WORLD PETROLEUM WUX NEW YORK via Western Union.

Executive-Editor, T. Orchard Lisle

Advertising Manager, S. J. Gallay

▼

Great Britain
110 Fenchurch St., E. C. 3, London
Telephone: Mon. 3310
Cable Address, Ruspam, London
European Director, A. C. Hardy

California
Bendix Building, Los Angeles
Telephone: Prospect 9191
Cable Address, Ruspam, Los Angeles
Manager, F. S. Norman

Subscriptions

ANNUAL subscription to WORLD PETROLEUM is offered at the flat rate of five dollars (U. S.) postpaid to any country in the International Postal Union, except in Canada where a special tax compels the publisher to charge $5.60.

For the convenience of subscribers the publisher will accept payment in any of the following currencies at the fixed rate shown below:

Argentina	14 paper dollars
Canada	5.60 dollars
Colombia	5.25 peso (gold)
France	130 francs
Germany	21 Reichsmark
Great Britain	One guinea
Holland	12.50 gulden
India	14 rupees
Italy	100 lire
Japan	10.50 yen
Mexico	10.50 peso (gold)
Peru	1.25 libra
Poland	45 zloty
Rumania	835 lei
Russia	1 chervonetz
Venezuela	25 Bolivar

Remittances or drafts to the order of the Publisher, WORLD PETROLEUM, payable in New York and London.

Subscriber's name and address should be in Roman capitals on the subscription order.

Official position of subscriber is requested.

Advance notice, if possible, of a change of subscriber's address should be given. Effect cannot be given at once to a change of address. The period of transmission of the subscriber's instructions through the mail extends the time required before the magazine can be mailed to the new address.

▼

Agencies

SINGLE copies of WORLD PETROLEUM are obtainable every month, within the delay imposed by the international mail service, at any of the following agencies:

CABIMAS, VENEZUELA—The German Store
CARACAS, VENEZUELA—Casa Letcher, Torres a Madrices 22
MARACAIBO, VENEZUELA—Compania Cartografica Venezolana, Apartado No. 331
CURACAO, D. W. I.—The Book Store Sluyter
THE HAGUE—Martinus Nijhoff, Lange Voorhout 9
LONDON—World Petroleum, 110 Fenchurch Street, E. C. 3
W. H. Smith & Sons, Ltd., Moorgate Met. Station
Willing & Co., Ltd., Moorgate Met. Station
NEW YORK—Telephone CHelsea 2-7398 for list of 20 newsstands carrying copies
PARIS—Librairie Brentano, 37 Avenue de l'Opéra
PORT OF SPAIN, TRINIDAD—Davidson & Todd, Ltd., 8 Frederick St.
TAMPICO—La Sonora, S. A., 25 Comercio Oriente

The price of a single copy is 55 cents in Canada, 2 shillings in other countries of the British Commonwealth and the equivalent of 50 cents (U. S.) elsewhere.

▼

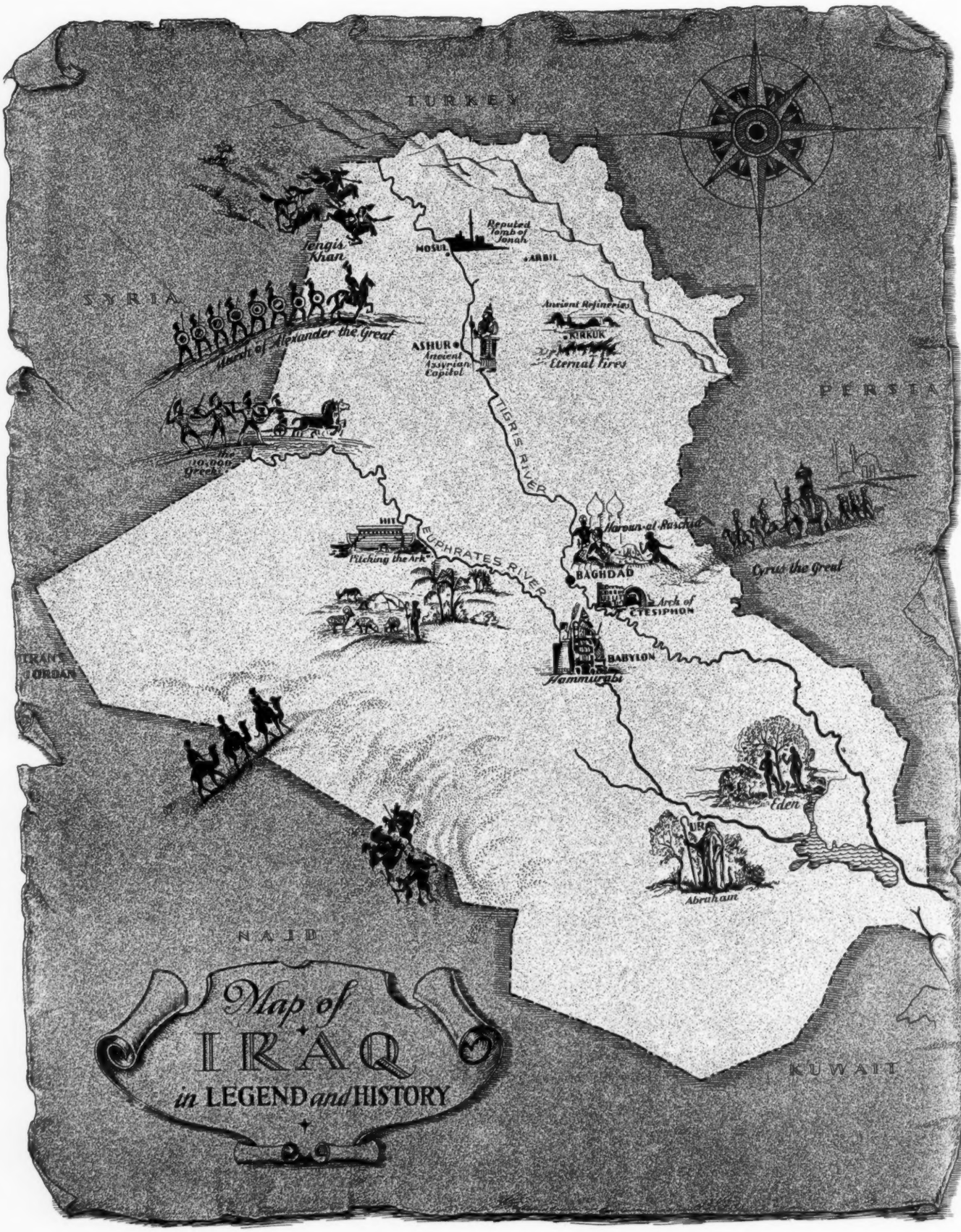
Particular Notices

CONTENTS of WORLD PETROLEUM are copyrighted by Russell Palmer, and contents may not be reproduced without permission.

Manuscripts and photographs submitted to the Editor are received only at the owner's risk. Prompt consideration will be given to them.

The Publisher does not necessarily endorse the views expressed by authors of signed articles. In the service of readers he will not hesitate to give publication to signed opinions in direct opposition to his own.

Advertising rates are scheduled in Standard Rate and Data. Copies of the schedule can be obtained on request to the Advertising Manager, 153 Waverly Place, New York, N. Y., or to 110 Fenchurch St., London, or to Bendix Bldg., Los Angeles, Cal.


TURKEY
SYRIA
PERSIA
NAJD
KUWAIT
Jengis Khan
Reputed tomb of Jonah
MOSUL
ARBIL
Ancient Refineries
KIRKUK
Eternal fires
ASHUR
Ancient Assyrian Capital
March of Alexander the Great
TIGRIS RIVER
EUPHRATES RIVER
Pitching the Ark
Haroun-al-Raschid
BAGHDAD
Cyrus the Great
Arch of CTESIPHON
BABYLON
Hammurabi
Eden
UR
Abraham
Map of
IRAQ
in LEGEND and HISTORY

NEW YORK • WORLD • LONDON

PETROLEUM

Iraq and the International Oil Situation

OPENING of a new oil field is at any time a development of interest and importance to the petroleum industry. When, however, the ranks of producers and exporters are enlarged by the accession of a new nation which counts oil as its chief natural resource it is an occurrence so rare and unusual that it attains the dimensions of an historical event.

Such an event will take place when the completion of the pipelines described in other pages of this issue places Iraq oil on the eastern shore of the Mediterranean. So far as concerns international trade this will mean the location of a new source of supply, not in the interior of Asia but right alongside one of the world's great trade routes and within easy reach of some of its most important markets.

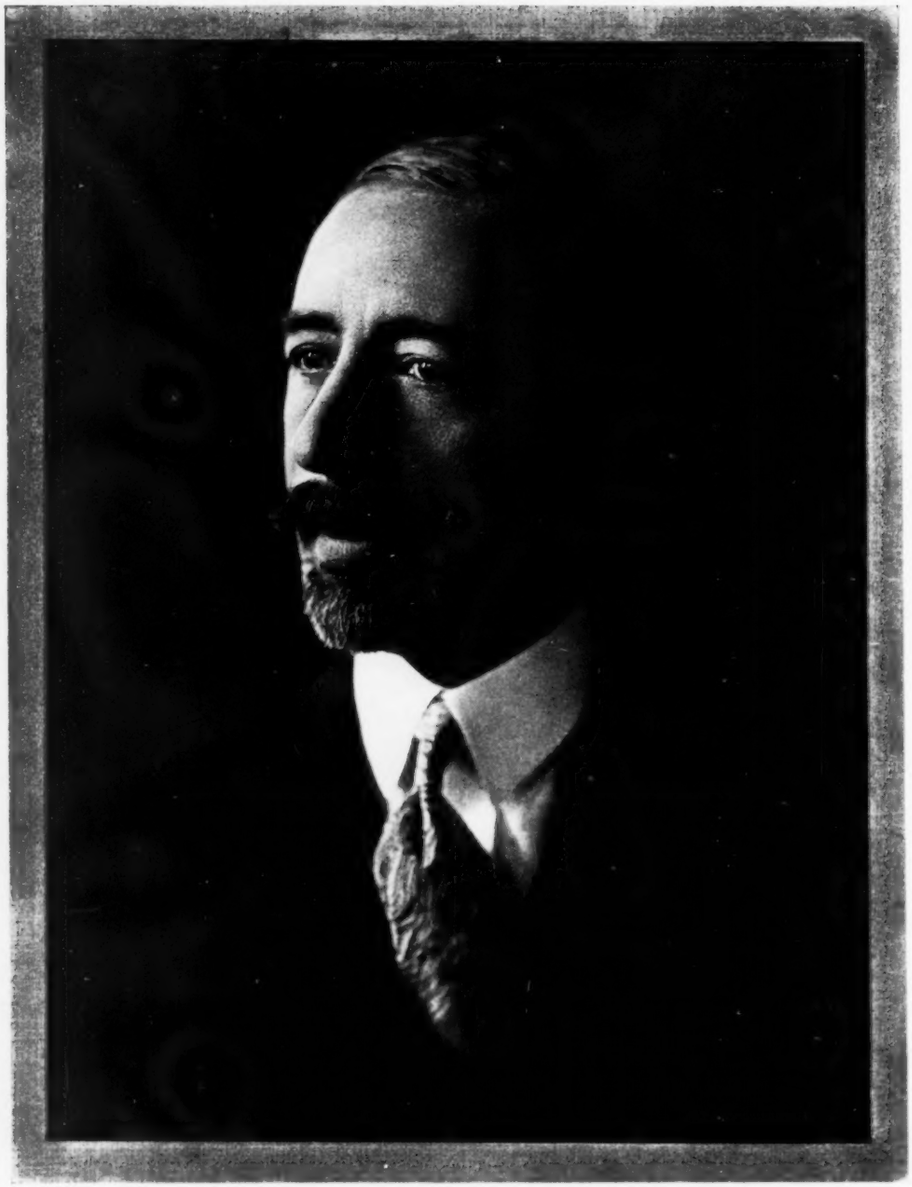
As a feat of construction the building of pipelines across hundreds of miles of desert, through a roadless and well-nigh waterless area, presents many unusual problems and the manner in which these are met and solved will provide a chronicle of absorbing interest as the work proceeds. Of even greater interest to those who are engaged in the direction of oil producing and marketing organizations serving the international field is the question of the position which Iraq is to occupy in the world of petroleum affairs.

At the present time when strenuous efforts are being made to hold oil production within the limits of world requirements for consumption accretions to total supply arouse no particular enthusiasm. In view of the fact, however, that Iraq is a newcomer in the family of nations with resources largely undeveloped and with not too numerous sources of available revenue it could hardly be expected that the Iraq Government would be content to wait longer than necessary to make its petroleum deposits contribute to the support of the State. Considering that oil can be recovered in Iraq at a relatively moderate cost and considering also its strategic location in relation to the markets of Europe, particularly those of the countries surrounding the Mediterranean, it would hardly be practicable for other oil producing interests to attempt to deny Iraq's output a share in international markets even were they disposed to do so. On the other hand participation in the development of Iraq's petroleum resources by the powerful international organizations that have consistently exerted their influence in favor of the stabilization of the industry affords assurance that Iraq oil is not likely to become a disruptive factor in the world's markets. Since the entire output of oil from the Mesopotamian area, at least for some years to come, will be no more than a fraction of the quantity thrown upon the market in 1931 by the sudden eruption of the East Texas field in the United States it is scarcely probable that the addition of this new source of supply will have any perceptible effect upon the international situation, particularly as no oil from Iraq will be available before 1936. By that time very great changes may take place in the situation now existing.

Although the Iraq field with the pipeline connections now being laid occupies a strong geographical position, that position is being attained only by the expenditure of a very large sum of money. Construction of the pipelines that will convey the oil from the producing area to shipping ports on the Mediterranean is a costly undertaking but it is an essential part of the development. Had not the Iraq Government been able to interest the combination of large oil interests which is carrying on the work, it is doubtful whether the considerable revenue which will inure to the Iraq exchequer in the present and in the future, could have been made possible.

One other outstanding fact which might be emphasized in this connection is that this constructive step of international cooperation is being taken at what is perhaps one of the most chaotic periods in the history of the petroleum industry. Side by side with this achievement is the moral progress resulting from the execution of this great enterprise in a way that results to the benefit of the population of the country concerned, and this perhaps bears some concrete relation to the endeavors of an Englishman and an American now dead — Lord Balfour and Walter Page — to ameliorate the condition of a backward people.

The most significant aspect of the development of Iraq's oil resources is indeed that it is proceeding as the joint effort of three nations and seven great petroleum companies. At a time when the difficulties of achieving constructive action even in local fields appear to be almost insuperable, when selfish sectional and national interests control commercial policy to the extent of impairing the investments of millions of security holders, Iraq supplies an instructive example of cooperation that may be studied to advantage by other members of the industry. The lamp in the desert may yet lead the way to real stabilization for the petroleum industry.



H. M. Faisal ibn Hussain,
King of Iraq.

Iraq—A New Nation Founded on Oil

WHETHER or not the Garden of Eden, as many of us were taught to believe, was located in the delta of the Tigris and Euphrates the region traversed by these rivers cradled the culture of the western world and in the past five thousand years has provided material for some very important chapters of history. It is necessary only to mention the names of such places as Ur and Nippur, of Babylon and Nineveh, of ancient Ctesiphon and relatively modern Baghdad, or of such famous characters as Sargon and Abraham, Hamurabi and Alexander, Nebuchadnezzar and Belshazzar, the Prophet Muhammad and Caliph Haroun-al-Rashid, to suggest the vast historic pageant that has passed through the centuries across the great stage extending from the shores of the Persian Gulf to the waters of the Red Sea and the Mediterranean.

The story of Iraq's past is a story of great ethnic movements, of invasions and conquests, of the rise and fall of successive dynasties, of the creation and decay of wonder cities. It makes this small corner of the world a treasure ground for the archaeologist and the historian. The glory of its great City Kingdoms, eclipsed by a long period of obscurity as a neglected province under foreign rule, has been replaced by the emergence of a new-old nation which now takes its position among the family of sovereign states. It seems both appropriate and dramatic that establishment of the complete independence of Iraq and its admission to full membership in the League of Nations, which takes place this month, should coincide with the inauguration of an era of industrial development which promises to make it one of the important oil producing countries of the world.

IRAQ indeed owes much to oil. Probably in no other part of the world has petroleum been known and utilized by man over such a long period of time. The pitch with which Noah made the Ark seaworthy was obtained, in all likelihood, from the bitumen springs which exist at various places in the valleys of the Tigris and the Euphrates. Certain it is that the basket boats used from earliest times by local navigators on these rivers were coated from the deposits of these seepages. Ancient refineries, antedating by centuries the beginning of the industrial era, are still to be seen in different parts of the country.

In earlier centuries oil was but an incident in the life of the peoples of the Mesopotamian plain and of no more than curious interest to the successive invaders of the territory but in recent times it has assumed a more vital aspect.

The existence within the present borders of Iraq of important petroleum resources undoubtedly inspired the keen struggle for its possession between the contending forces in the Great War and supplied a large part of the incentive for its creation at the end of that conflict into a separate State. Within the past dozen years the Iraq people have elected as their King Faisal ibn Hussain, have set up a modern form of government and have inaugurated measures for the development of the natural resources of their country, including the utilization of their stores of mineral oil. The task of administrative organization was carried out under the guidance of Great Britain acting as a mandatory power, but the British influence was lightly and tactfully applied, always with the purpose in view of establishing the complete autonomy of Iraq. In 1929 Britain recommended to the League of Nations that full independence should be made effective at the end of three years and that action has now been taken. Thus Iraq stands at the threshold of its national career with the promising outlook afforded by a well organized system of government, an able and popular ruler, friendly relations with all other nations and the assurance of a substantial income from concessions for the development of its petroleum deposits.

Iraq Oil—An Expression of International Cooperation

Oil Interests of Four Nations Unite in Development of Petroleum Resources of Mesopotamia, Long the Objective of Clashing Ambitions—Work Progressing Rapidly Under New Agreement.

IRAQ, latest of the world's oil fields to be brought into active development, probably is the oldest within the knowledge of mankind. Located in the region that cradled the beginnings of western civilization its existence is recorded in the Book of Daniel, and the fiery furnace in which the three Hebrew youths were tried, if tradition may be trusted, was none other than the "eternal fires" which burn today at the natural gas seepages close to Baba Gurgur's controlled flow.

As a factor of potential industrial importance to the modern world, however, Iraq has attracted the serious interest of oil developers only within the past half century. In that time, and particularly during the past two decades, it has formed the crux of a tense international struggle, has been a primary objective in shaping the military operations of the Great War in one of its important theatres and has been an important factor in the creation of a new independent nation. It has been the concern of Foreign Offices, the motivating cause of intricate commercial and political intrigue and the issue around which has been waged one of the great diplomatic battles of modern time, that of the Open Door. These international phases of Iraq's progress contain the material of a dramatic and intensely interesting story which involves some of the most dynamic personalities of our present age. For the purpose of the present narrative they can be touched upon only briefly and to the extent necessary for an understanding of the piquant background to the existing oil situation in Iraq.

In the early years of the Twentieth Century the expanding ambitions of Germany, converging upon Mesopotamia, brought her into active rivalry with British interests. Broad political policies—Germany's desire to acquire a position of strategic advantage in the Near East; Britain's unwillingness to see a possibly disturbing interest so close to the borders of India—undoubtedly were the chief factors influencing the policies of the two powers. The existence within this territory, however, of potentially important petroliferous deposits undoubtedly was a consideration not entirely overlooked.

In 1901 William K. D'Arcy, who had obtained from Persia the concessions which led to the foundation of the Anglo-Persian Oil Company, started negotiations looking to the acquisition of petroleum rights in upper Mesopotamia. At this time Iraq was a little considered and administratively neglected province of Turkey and negotiators for the privilege of exploiting its petroleum resources were compelled to deal with the Turkish government. For the next dozen years an intermittent struggle between German and British interests went on, the balance of favor apparently inclining now to one side, now to the other, but neither one obtaining a clear-cut and decisive victory. In 1904 authorization for a survey was granted to German interests with an option for later development but it led to no final agreement.

In 1908 Mr. D'Arcy's representative was on the point of concluding a concessionary agreement but negotiations were interrupted by the fall of Sultan Abdul Hamid and the emergence of the Young Turk government. Following this change in control the situation was complicated by the reappearance on the scene of American interests represented by Admiral Colby M. Chester, who had previously received promises of undefined

Baba Gurgur, famous discovery well of the Kirkuk field.

Haifa harbor from the slopes of Mt. Carmel, terminus of one branch of the Iraq pipeline. The branch of the line through British mandated territory terminates here.

Wide World Photo

The Eternal Fires—natural gas seepages at Baba Gurgur, mentioned in the Bible

concessionary rights. For many years Admiral Chester continued to press ambitious plans for railway and industrial development in this part of the world, an effort that ceased only after the final settlement of claims that followed the Treaty of Lausanne in 1923.

The year 1911 saw the commencement of a new phase of collaboration among hitherto competing interests with the formation of a company called "African and Eastern Concessions Ltd." which in 1912 changed its name to Turkish Petroleum Company, Ltd. It represented a union of interests between the National Bank of Turkey founded by Sir Ernest Cassel, the Anglo-Saxon Petroleum Company (Royal Dutch-Shell group) and the Deutsche Bank, strongly supported by the German Government. For the first time there was a union of British and German interests in seeking the development of Mesopotamian oil, an expression of the ardent desire of Sir Ernest Cassel to promote more friendly political and commercial relations between the British and German nations.

In this promising set-up, however, no provision had been made for the D'Arcy interests which for ten years had been actively seeking a grant to develop Iraq oil. These interests continued to assert their claims and the rival groups of claimants each apparently had strength enough to prevent their opponents from securing the coveted concession but not sufficient to obtain it for themselves. The whole affair was involved in intricacies of finance and diplomacy.

Up to the beginning of 1914, therefore, the struggles of rival interests and such efforts as had been made to compose their differences had resulted in a stalemate. In March of that year, largely through the efforts of the British Government to which was joined the active support of the German authorities, a reconstitution of the Turkish Petroleum Company was effected. The Anglo-Persian Oil Company, which had been represented by the D'Arcy group, took over the 50 percent interest formerly held by the National Bank of Turkey, leaving the remaining shares in equal division between the Royal Dutch-Shell group and the Deutsche Bank.

Being able at last to present a united front in its negotiations and having the active support of the British and German governments the Turkish Petroleum Company resumed its efforts to obtain the long sought concession over the oil resources of Iraq. At the end of June 1914 the Grand Vizier, acting on behalf of the Ottoman Government, gave a written undertaking to the British and German Ambassadors to lease to the Turkish Petroleum Company the petroleum deposits of the vilayets of Mosul and Baghdad. At that moment war burst upon Europe and blotted out all immediate efforts to implement the undertaking. It led, however, to the sequestration of the shares in the Turkish Petroleum Company that had been held by the Deutsche Bank.

Wartime operations in the Near East, the Mesopotamian campaigns of the British armies which left them at the end of the war in control of the territory included in the Iraq oil concession, the promises of independence held out to the Arabs and the difficulties of the peace conference in adjusting conflicting commitments already have formed the theme of many volumes. The fascination of the subject and the intricacy of the operations in this particular theatre undoubtedly will bring many more additions to this extensive literature. For the purpose of understanding its effect upon the development of Iraq oil, however, it is sufficient to note that the war changed the Mesopotamian situation in two very important respects.

Iraq ceased to be a Turkish province and became a separate country under temporary British mandate with a pledge of complete independence to follow.

France emerged as a new factor in the situation, becoming the mandatory power of Syria and acquiring the right to a voice in Near Eastern affairs. By the celebrated agreement of San Remo, signed on April 25, 1920, it was specifically agreed between representatives of the French and British governments that France should have a quarter interest in any commercial company formed to exercise the petroleum rights acquired in Iraq but that such company should be under permanent British control.

River of oil flowing from Baba Gurgur No. 1.

Ancient water wheel on the Euphrates, used for irrigation.

At this point the United States raised the issue of the "open door" which was to involve diplomats and publicists in a storm of discussion for the next few years. Though the issue itself was a broad one it had a very direct bearing upon Iraq oil because that was taken by the American Government as a concrete example of an industrial field in "mandated" territory that it held should be open to participation by its nationals on equal terms with all others. Without going into the many ramifications of the "open door" principle or the still unsettled question whether it was violated by the San Remo agreement between France and Britain as to Mesopotamian oil the position taken by the United States led to the inclusion of American oil companies in the reorganization of the Turkish Petroleum Company and the transfer to this American group of one-half the share interest originally held by the Anglo-Persian Oil Company.

As ultimately constituted, although this alignment was not completed until 1928, ownership of the Turkish Petroleum Company was placed in the hands of British, French and American groups. A five percent interest, consisting of shares without voting power, was assigned to Participations and Investments, Ltd., a company representing C. S. Gulbenkian, in consideration of Mr. Gulbenkian's interest in the original holding of the National Bank of Turkey. The remaining 95 percent was equally divided among the following companies, each holding a quarter interest or 23.75 percent.

1— The Anglo-Saxon Petroleum Company, a subsidiary of the Royal Dutch-Shell group, which had been one of the original participants in the Turkish Petroleum Company at the time of its organization.

2— The D'Arcy Exploration Company, owned by the Anglo-Persian Oil Company in which as is well known the British Government holds a 50 percent interest and in which the Burmah Oil Company is also a large stockholder. Through its participation in Anglo-Persian the British Government is, therefore, an indirect partner in the development of Iraq's oil fields. Like the Anglo-Saxon Petroleum Company the D'Arcy Exploration Company had been an early participant in the Turkish Petroleum Company's enterprise, but its original holdings had been cut in half to make room for American interests to come in.

3— The Compagnie Fancaise des Petroles embodied the French share in the undertaking which replaced the original German holdings of the Deutsche Bank. The company represents a consortium of French industrial and financial interests in oil and the French Government is one of its important shareholders.

4— The Near East Development Corporation which was formed to assume American holdings originally allotted to the Standard Oil Company (New Jersey), the Standard Oil Company of New York, the Pan-American Petroleum and Transport Company (Standard of Indiana), the Gulf Refining Company, the Atlantic Refining Company, the Sinclair Consolidated Oil Company and The Texas Corporation. The Sinclair and Texas companies did not join the enterprise and the holdings of Pan-American Petroleum and Transport and of Atlantic Refining later on were acquired by partners in the American group leaving the Gulf, Standard of New York and Standard (New Jersey) in the American segment of the international combination.

Before this final adjustment of interests the Turkish Petroleum Company had encountered further vicissitudes. The validity of its concession from the Turkish Government in 1914 had been attacked at the Lausanne Conference and the authority of the newly established Iraq Government to negotiate a concession in the Mosul district was not fully established until after the Treaty of Lausanne had determined that this region was to be a part of Iraq. Once this question was settled, however, negotiations between the Company and the Iraq Government went forward and resulted in 1925 in the conclusion of a convention which gave to the Turkish Petroleum Company for a period of 75 years the exclusive right to exploit the oil of the vilayets of Baghdad and Mosul, subject to certain requirements set forth in the agreement. The more important of these conditions were as follows:

The Company was to begin a geological survey within eight months; to select within 32 months 24 rectangular plots of an area of eight square miles each; after four years the Government was to select annually a minimum of 24 similar plots to be offered for competitive bids. The

Camp and No. 1 well of the Palkhanah field.

Panoramic view above the pipeli

Company was to pay a royalty on the oil it produced of four shillings (gold) a ton. On the other hand the Company was to receive all the proceeds accruing from the sale of plots by the Government. The Company was also to construct a pipeline to an undefined port, as soon as it should be commercially justifiable.

Up to this time the claim of the Turkish Petroleum Company to oil exploitation rights in Iraq had been based on the concession obtained from the Turkish Government in 1914. The new undertaking, however, was quite independent of this earlier claim and gave the Company a clear title conferred by the sovereign authority of Iraq. The agreement was signed in March 1925 and in the autumn of that year the Company dispatched to Iraq a party of 12 geologists, including three Americans and three Frenchmen, to make a survey of the concession area. Owing to the stipulations regarding time the survey necessarily was rapid rather than intensive, and a year later a selection was made of ten areas for tests by the drill.

Actual drilling was begun in April 1927 and during the year it was extended to eight of the ten areas previously selected. On October 14 an important gusher was struck at Baba Gurgur near Kirkuk. This well flowed at the rate of 60,000 bbl. a day until it was shut in and supported the conclusions of the geologists as to the existence of an important field in this district. During the ensuing two years intensive drilling confirmed the existence of very extensive deposits of high grade oil of great potentialities on the Kirkuk structure extending N. W. and S. E. past the town of that name. So far as it has been delimited the field is approximately 40 miles long and between one and two miles in width, having an area of 50 square miles or more. The field is fairly continuous and homogeneous in character. Thus far 31 wells have been drilled and No. 32 is now being sunk. Of these all but one will yield oil, and all but two upwards of 1,000 bbl. per day. The wells range in spacing from less than half a mile to more than three miles apart. They vary from 1200 to 3300 feet in depth according to their position on the structure. The "pay" is struck at depths varying from 1000 to 2700 feet, also according to position.

Thus far Kirkuk is the one field of established importance developed in Iraq. Drilling results elsewhere have been less satisfactory. Oil was found at Qaiyarah, but in some areas dry holes were encountered and in other places great drilling difficulties prevented the objective being reached.

Owing to delay in determining parts of the national boundary line and unsettled conditions in portions of the desert territory progress in making a comprehensive survey was hampered and in 1927 the Company requested an extension of time for making a selection of plots to be offered under the terms of the agreement. When this extended period expired in 1929 the selection was made only under protest.

In the meantime Sir John Cadman, who had rendered distinguished service in dealing with the British Government's petroleum requirements during the war and subsequently, as chairman of the Anglo-Persian, had greatly developed the efficiency of that company's operations, had become chairman of the Turkish Petroleum Company. In June 1929 the Company's title was changed to the more appropriate one of Iraq Petroleum Company.

Constitution of Iraq Petroleum Co.

	Ownership %
The Anglo-Saxon Petroleum Co. (Royal Dutch-Shell Group)	23.75
D'Arcy Exploration Company (Anglo-Persian Group)	23.75
Compagnie Francaise des Petroles (French Group)	23.75
Near East Development Corporation (American Group)	23.75
Participations & Investments Ltd. (Gulbenkian Interest)	5.

By this time it had become evident that the "plot selection" system of determining the areas to be developed was neither in the interest of the Iraq Government nor the concessionary company. The most serious objection to it was that it presented insuperable obstacles to that unit development of the various oil structures on which the Company was to select its plots which is now recognized as the only scientific and economic method of recovering petroleum without undue waste. Moreover, the system provided in the convention for putting up plots to tender held within it the possibilities of much future friction.

The negotiations for the revision of the convention began in the autumn of 1929, continued sporadically through the whole of 1930, and were not brought to a successful conclusion until March, 1931, when agreements were signed, which effected important modifications in and additions to the terms of the 1925 convention.

The provisions for plot-selection and annual putting up of plots to tender were eliminated and the Company was given the sole right to exploit all the oil in the vilayets of Baghdad and Mosul, east of the River Tigris. This area of 32,000 square miles, most of which is geologically unexplored territory, includes the whole of the Kirkuk structure.

The Company was to undertake the construction of a pipeline system of a total capacity of not less than 3,000,000

Transporting pipe jims through a street in Kirkuk.

...view ...ditha Town which is just ...pipeline ...ssing of the Euphrates.

tons of oil a year (about 22,500,000 bbl., but the line actually to be built will be capable of handling over 30,000,000 bbl. annually) part of which system was to be constructed by way of Rutbah to a terminal on the Bay of Acre, the Company being free to construct another pipe line to any other terminal on the Mediterranean. This pipeline system was to be completed not later than December 31, 1935. The Company undertook to pay to the Government of Iraq annually, until and including January 1 immediately preceding the date of regular export of oil to the Mediterranean the sum of £400,000 gold, of which £200,000 would be recoverable from subsequent royalty payments, in any year when royalty payments exceeded £400,000.

The Company was given certain additional rights ancillary to the construction of the pipeline, and was exempted from state and municipal taxation on its operations and profits, in consideration of a yearly payment of £9,000 up to the first of January immediately preceding the commencement of regular exports. Thereafter it was to pay £60,000 for the first 4,000,000 tons of oil exported and £20,000 for every additional million tons.

The provision in the new agreement for a dual pipeline system met both the requirements of the Company and the views of its various shareholders, and the line as now designed, leaving the oilfields at Kirkuk, bifurcates at Haditha on the Euphrates, where one line runs via Palmyra through Syria to Tripoli, which is under the control of the Lebanese Government and in French mandated territory, while the other runs via Rutbah through Transjordan to Haifa, which is the port of Palestine and in British mandated territory. The length of the line, as far as Haditha, is 150 miles; thence the line to Tripoli covers 381 miles, and that to Haifa 468 miles. A double line extends from Kirkuk to Haditha.

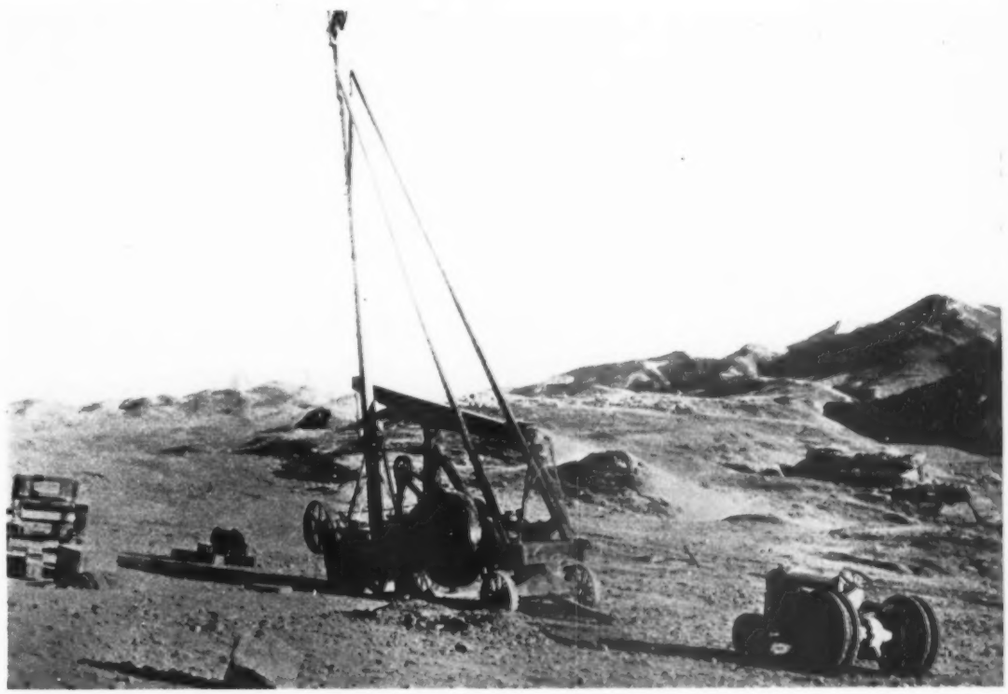
While unanticipated delays have occurred in bringing the exploration of Iraq's oil resources up to the point where the actual work of making these available to the outside world can go forward they have served a useful purpose by enabling the enterprise to be put on a much more satisfactory footing than was provided by the original agreement, both from the viewpoint of the Iraq Government and from that of the operating company as well. Instead of having its holdings in the form of small plots scattered over a wide domain the company has a connected homogeneous field which can be developed gradually in the most scientific manner so as to produce the maximum quantity of petroleum with the minimum of waste. The Government on its side is assured of a large revenue extending over a long period and has been left free to dispose of block concessions covering other portions of its territory, which it has done recently. Since the company and the Government have bound themselves to live and work together for three-quarters of a century the importance of a fair and mutually advantageous arrangement is evident.

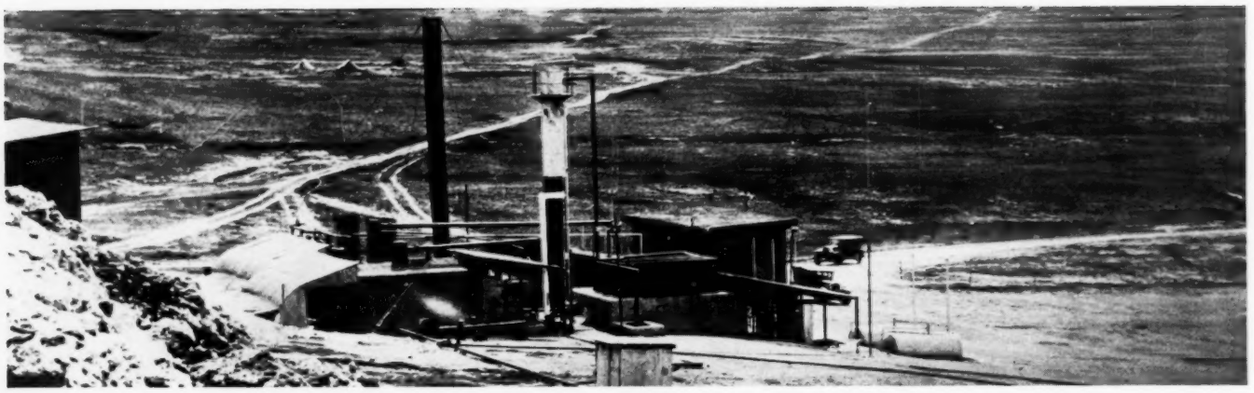
With its relations to the Iraq Government on a satisfactory basis, its operating territory definitely delimited and its field development advanced to the point where the existence of a considerable and possibly a very large supply of oil was assured the Iraq Petroleum Company was able in 1931 to settle down to the task of placing itself on a commercial operating basis and making its supplies available to the industrial world. The important and immediate step necessary to the achievement of this purpose was the construction of the pipeline which it had pledged itself to complete by the end of 1935. The building of this line across 1,200 miles of desert waste is in many respects the most ambitious and unusual project of its kind that has been attempted by the international petroleum industry and calls for separate treatment as a story by itself which appears in subsequent pages.

Along with the formulation of plans and preparations for its great pipeline the Iraq Petroleum Company, under the inspiration of Sir John Cadman's leadership, has been engaged in building up an efficient organization for which it has drawn freely on the technical ability and practical experience of half a dozen countries. In the main, however, Britain and America are supplying the headquarters and field personnel. The main offices of the company have been established at City Gate House, Finsbury Square, London, and field offices have been set up at Kirkuk, Baghdad and Basra in Iraq, at Haifa in Palestine, at Amman in Transjordan and at Beyrouth and Tripoli in the Lebanon.

With the problem which ordinarily would present the greatest difficulty to a new company entering the petroleum field—that of developing a marketing organization and sales outlets—the Iraq Petroleum Company does not have to concern itself. Its output will be taken up by the various constituent interests and distributed through channels already well established. The Company can concentrate its efforts, therefore, on the problems of production and transportation. It is the ambition of its directors to place it in these respects among the most efficient and scientifically conducted petroleum organizations in the world.

Portable drilling rig in Palkhanah field.





Topping plant at Baba Gurgar, constructed to serve local needs

Terms of the Iraq Company's Contract

Requires Payment to Iraq Government of £400,-000 Yearly by Way of Royalties and the Supply of the Domestic Needs of the Country for Petroleum Products—Agreement Runs for 75 Years.

WHILE the convention between the Iraq Government and the Iraq Petroleum Company is a document of considerable length its principal provisions may be summarized as follows:

The Government grants to the Company for a period of 75 years the exclusive right to take, manufacture, transport and sell petroleum products obtained from the territory included in the vilayets of Baghdad and Mosul from the east bank of the Tigris to the Iraq-Turkish and Iraq-Persian borders except for the small area known as the Transferred Territories which is covered by a previous agreement between the Government and the Anglo-Persian Oil Company. It is also provided that if the Company discovers oil on any marginal field to which no other concession has at that time been granted it may receive the privilege of working that marginal field to a distance of not more than ten miles to the west of the Tigris.

The Company undertakes to construct a pipeline system capable of handling not less than 3,000,000 tons yearly from a point within its defined area by way of Rutbah to a terminal in the Bay of Acre while at its option it may construct another line to any other terminal on the Mediterranean. The line must have a yearly capacity of not less than 3,000,000 tons and until the carrying capacity of the southern line reaches 4,000,000 tons per annum at least 50 percent of the capacity of the whole system must be constructed on the southern route via Rutbah. The pipeline must be completed by the end of December 1935. It is provided that the Company may form a subsidiary corporation to build and operate its pipelines and that the Company may at its discretion transport the oil of other parties provided the quantity from its own area handled through the pipeline is

Ruins near Ancient Ninevah. The Tomb of Jonah is said to be beneath the Mosque.

View of Baghdad from across river, showing government quarters.

not reduced below 3,000,000 tons annually.

The Company is required to pay to the Government a royalty of four shillings per ton (gold) on all oil saved. The total sum paid in the course of a year shall not be less than £400,000 but in case the earned royalties are less than this amount the difference up to £200,000 may be deducted from subsequent payments in years when the royalties exceed £400,000.

The section relating to royalties contains the following provision for their determination:

(1) Until a date twenty years after the completion of a pipeline to a port for export shipment the rate of royalty shall be four shillings (gold.)

(2) For each period of ten years after the said date the rate of four shillings (gold) shall be increased or reduced by the percentage by which the profit or loss shall be greater or less during the five years immediately preceding such period than during the first fifteen of the aforesaid twenty years, provided that (a) "profit or loss" shall mean the difference between the average market price per ton of the aforesaid substances and the average cost per ton of producing, transporting, refining and distributing the same; (b) "average market price per ton" shall mean the total prices (ascertained as closely as possible) obtained for the products of the said substances, divided by the total tonnage (ascertained as closely as possible) of such products, and "average cost per ton" shall mean the estimated total cost of producing, transporting, refining and distributing the said substances divided by the said tonnage; (c) the minimum rate shall be two shillings (gold) and the maximum rate six shillings (gold.)

THE Company shall procure the supply and sale throughout Iraq of petrol, kerosene and fuel oil sufficient to meet local requirements and shall arrange for keeping a stock in reserve for the Government. It will be allowed to form a separate marketing company for this purpose. The Company also undertakes in certain circumstances, to construct for account of the Goverment a refinery in the vicinity of Kirkuk for the purpose of supplying Iraq's requirements of refined products and to sell to the Government at the lowest price at which it sells its product elsewhere, with due allowance for costs of transportation.

Authorization is given to the Company to construct railway, telegraph and telephone lines, wells, bridges, buildings, wharves, reservoirs and other works necessary to its operations. It is privileged to use roads, railways and waterways on payment of the established charges for such services and will be permitted to employ any form of transport it desires for the movement of men and materials, subject to the general regulations imposed by the Government on such forms of transport.

The Company is allowed to import free of duty all materials, machinery, plant and stores necessary for its operations and the Government agrees to permit the free passage across its frontiers of materials required for the construction, operation and maintenance of pipelines.

It is specified that the Company shall remain a registered British Company and that its chairman shall at all times be a British subject. It is also stipulated that so far as possible, subjects of the Iraq Government shall constitute the employes of the Company in Iraq but permission is given to bring in managers, engineers, other skilled workers and clerks to the extent that may be necessary.

At the end of 75 years the convention is to be terminated and all the Company's land, buildings, pipelines, transportation facilities, machinery parts and fixtures is to revert to the Government without charge.

The Kifri structure in northern Iraq

Rutbah Fort—landing place for airplanes. Pipeline passes a few miles south.

Bringing Iraq Oil to the Mediterranean

Vast Work of Pushing a 1,200-Mile Steel Line Across Desert Involves Unusual Problems of Transportation, Construction and Field Corps Maintenance.

AT THE present time the forces of the Iraq Petroleum Company are getting into action on a task that is one of the most interesting and unusual ever undertaken in the oil industry. While the lines that will convey the output of the wells in eastern Iraq to tidewater on the shores of the Mediterranean and the Red Sea are by no means the largest or longest that have been laid, their construction offers problems that have not had to be dealt with elsewhere—at least not on a similar scale.

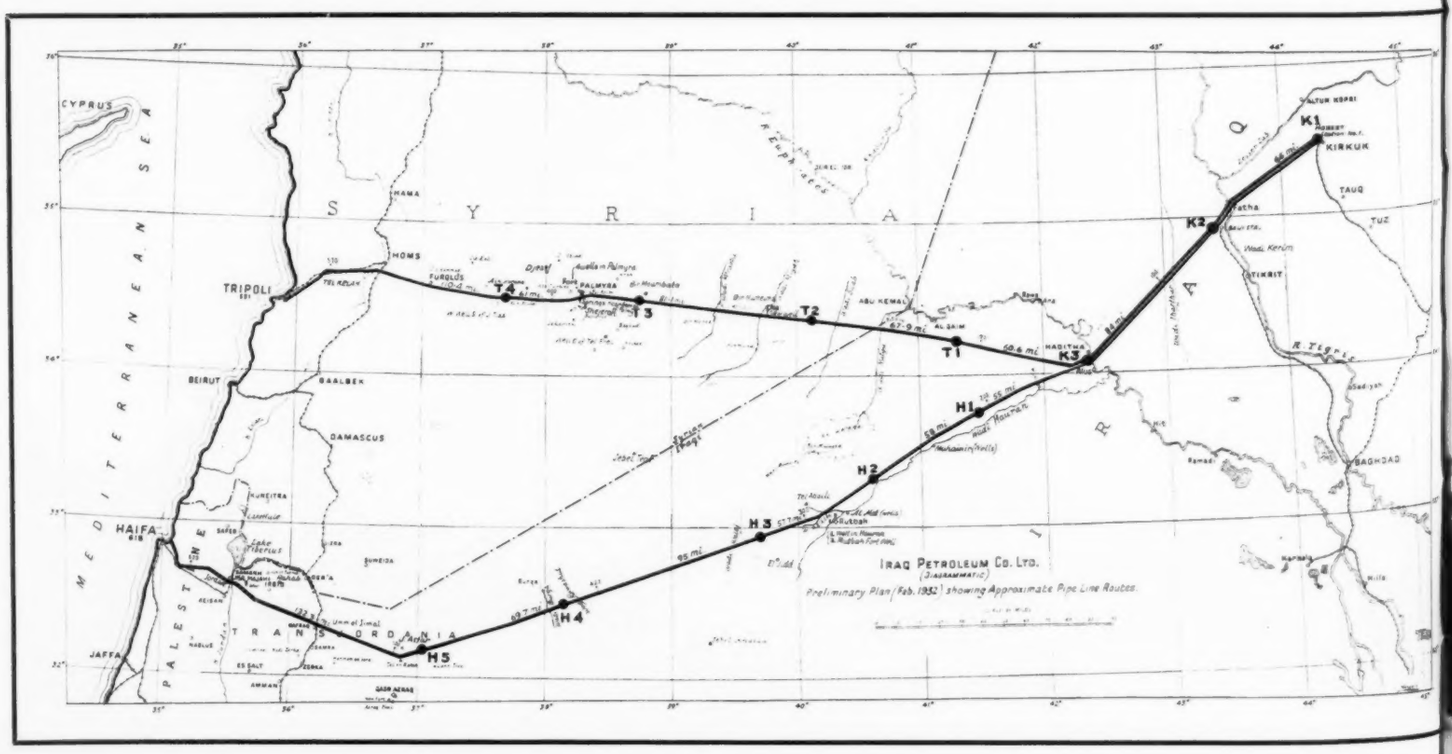
From Kirkuk, on the eastern bank of the Tigris, to Tripoli, on the eastern shore of the Mediterranean, following the route of the pipeline, is 531 miles; from Kirkuk to Haifa in Palestine is 618 miles. The total distance covered by the two lines is 1,180 miles. Practically the entire route, which is shown in detail on the accompanying map, is through desert wastes, with no settled population except in a few small towns, with no roads or railways, with no facilities for housing and feeding workers except those which the Company itself will supply and, over vast stretches, without water for the use of workmen, animals and machines. The sinking of wells for water and the laying of mains for its conveyance to stations, the erection of permanent and temporary buildings along the line, the setting of poles and stringing of telephone and telegraph wires, the provision of transport facilities for men, machinery and material, the distribution of 120,000 tons of pipe along the route, protection from marauding tribesmen, and the maintenance of some thousands of workmen far from supply bases are all requirements for which adequate provision must be made before the work of putting down the pipe itself can be undertaken. Work on these various projects is going forward rapidly and within a few months the sections of pipe will begin to spread across the sands in readiness for the trenching outfits to bury it.

To understand the nature of the country in which this work is to be carried on a description of its main physical features is given herewith. With the aid of the map and the illustrations to which reference is made in the article it is hoped that the reader can gain a fairly definite picture of it.

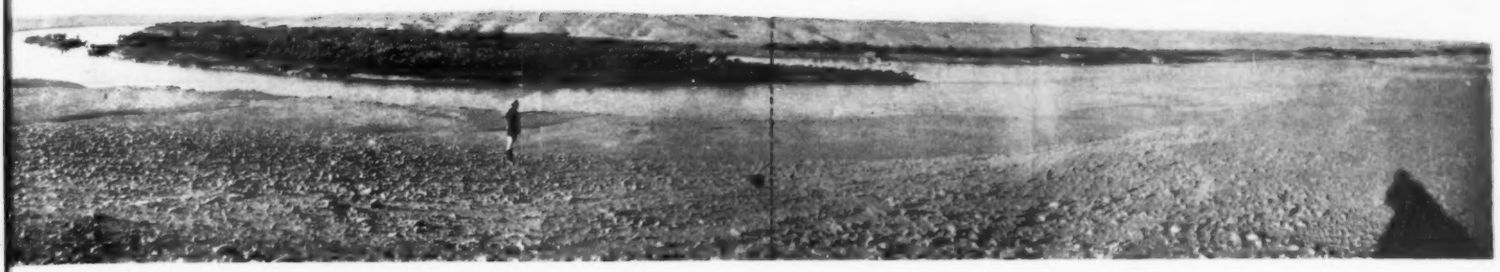
The main oilfield from which it is intended to draw production at the commencement of operations is situated near Kirkuk, which is approximately 150 miles due north of Baghdad. The first pumping station is to be located at Hassar, where the ground elevation is approximately 1,000 ft. above sea level. From this point the line, in duplicate, will pass in a south-westerly direction to Fatha Gorge, where it will cross the river Tigris, being about 400 ft. above sea level.

The country between Hassar and the Tigris presents no difficulties, though the approaches to the river are rough on both sides.

From the Tigris the line proceeds still in a south-westerly direction and at Mile 66 is situated the second pumping station,



Route of pipeline from Kirkuk to Haifa and Tripoli showing location of pumping stations.



No. K 2. At Mile 95 the line crosses the Wadi Tharthar, at which point the elevation above sea level is about 200 ft. The country between Fatha and Wadi Tharthar presents no difficulties, but the approaches to the Wadi are bad and there are salt marshes and gypsum.

From Wadi Tharthar the line proceeds directly to Haditha, where it crosses the river Euphrates, south of the town. The country between Tharthar and Haditha consists chiefly of flat gypsum rock rising to a summit of 750 ft. above sea level. The approaches to the Euphrates present some difficulty as they are steep and rocky.

On the west of the Euphrates is situated the third pumping station, K 3, and approximately five miles west of this point the two lines bifurcate, the northern branch proceeding via Palmyra to Tripoli and the southern branch via Rutbah to Haifa.

The first pumping station on the southern route, H 1, is situated approximately 55 miles from Haditha. The route for the first 20 miles is somewhat rough, but from this point to Rutbah the going is extremely good. The line rises at Rutbah to an elevation of 2,000 ft. above sea level. Just after passing Rutbah the line takes a slightly more westerly direction and passes over a flat desert, varied at times with rather rolling stony country and a few small wadis, reaching the lava country south of Burqa. The summit of the southern line is reached about 35 miles west of Station H 4, where it crosses the slope of an extinct volcano at an altitude of 3,150 ft.

The lava country, which presents one of the most formidable difficulties to the pipeline construction, extends from Burqa to Umm el Jimal. The lava is a basalt rock, which in places appears as a solid sheet and in others covers the surface of the ground in boulders varying from the size of a man's head up to a cubic yard. The sand under the boulders is loose and abrasive, so that even when the boulders are removed transport presents great difficulties.

Where the pipeline crosses the river Tigris at Fatha.

After leaving Jebel Asfar the subsoil is firmer. At this point the line takes a more northerly direction.

From Umm el Jimal to Mafrak the country is flat, rising towards Mafrak. After leaving Mafrak the pipe route passes through limestone hills on the way to the Jordan, the hills becoming high and of solid limestone after passing Irbid which is 18 miles east of the Jordan. At this point the line is 2,600 ft. above sea level. The line then falls very rapidly to the Jordan Valley crossing, at which point it is 850 ft. below sea level. From Irbid to Haifa the line runs through populated districts with numerous villages and a good deal of cultivation. After crossing the Jordan the line rises rapidly and 10 miles west of the Jordan is 750 ft. above sea level. From this point it falls in a steady slope through the valley of Esdralon to the Bay of Acre, the terminal point being approximately 1½ miles east of the harbor of Haifa.

The total length of the southern route from Hassar to Haifa is approximately 617 miles and there are eight pumping stations on this line, three of them (Stations K 1, K 2 and K 3) being double stations, and the remainder (H 1 H 5) being single stations.

After leaving the point of bifurcation west of Haditha, the northern line proceeds westerly, more or less parallel with the river Euphrates. From Haditha to the Wadi Rutka, which approximately marks the frontier between Syria and Iraq, the ground is generally rocky, with numerous rock ridges, until the route crosses the deep depression of the Wadi Rutka at a point approximately 250 miles from Hassar.

From the frontier the line continues in a westerly direction towards Palmyra. The country generally is stony, with occasional deep wadis. The stony sections alternate with flat alluvial desert. There is a gradual rise from the Euphrates, and the general desert level of 1,800–2,000 ft. is reached at approximately 20 miles west of Station T 2.

The line passes close to and south of Palmyra, the ancient Tadmor, where it is at an elevation of 1,250 ft. above sea level. After leaving Palmyra the line climbs steeply to an elevation of 2,000 ft. above sea level, over a rocky saddle in the hills at approximately 30 miles west of Station T 3.

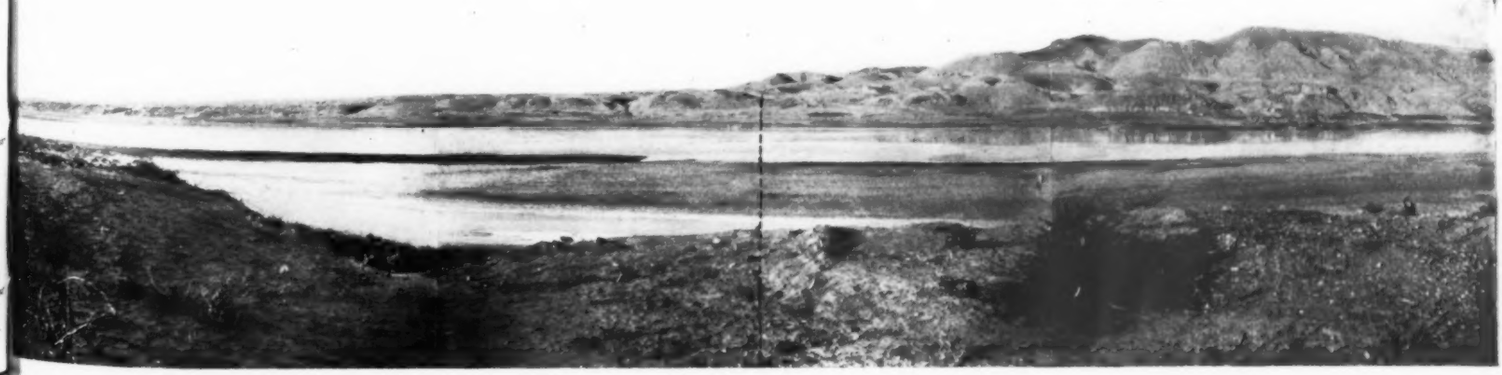
From this point the line climbs gradually, mostly over flat alluvial ground, till it reaches the summit of this route at a point about 45 miles west of Station T 4, a few miles west of Furqlus, where it reaches an elevation of 2,600 ft. above sea level. From here the line is in stony limestone hills, dropping into the valley of the Orontes just south of Homs, at an elevation of 1,600 ft.

From the valley of the Orontes the line climbs up to approximately 1,750 ft. above sea level and then drops more or less steadily to Tripoli. Just west of the Orontes Valley the line is in lava country for about 15 miles and thence runs more or less parallel to the road and railway, reaching the terminal site just to the south of Ras-el-Lados, some four miles northeast of Tripoli harbor.

A vast amount of difficult work was involved in surveying and selecting the route to be followed by the pipeline. Numerous changes and modifications of the route were made as the result of reconnoitring expeditions sent out in 1928, 1929 and 1930. The 1929 survey was under the charge of Dan Towl, vice president of the Andian Corporation, and a well-known figure in pipeline circles.

In December 1930 H. S. Austin was appointed Chief Engineer to take charge of the planning and construction of the pipelines. Mr. Austin is a recognized expert in this branch of the industry. In 1925 he was elected President of the Tuscarora Oil Company and just prior to going to England he had directed the

Crossing of the Euphrates, looking from the right bank.



Heavy lorry on pipeline route in Transjordan country.

building of the Ajax pipeline, a 65,000 bbl. line connecting Glenn Pool, Oklahoma, with Wood River, Illinois, a distance of approximately 400 miles.

During 1931 the work of preparing designs and specifications went forward in London while three survey parties completed in Iraq, Palestine and Syria the necessary location surveys and supplied the data required for the preparation of plans and profiles. Early in 1932 it was possible to go forward with steps toward definite construction. Orders were placed for pipe, telephone and telegraph material, steel frame buildings, trucks, tractors and other transportation equipment, aerial ropeways and other supplies and materials incidental to the building of the pipelines. Delivery of some of this material is going forward at present and before the end of the year distribution of the pipe along the route will be under way proceeding simultaneously from the three terminal points Haifa, Tripoli and Kirkuk. Orders for other equipment such as engines and pumps will be issued from time to time so as to insure delivery as needed. Several parties of engineers and other representatives have been despatched to the field to make ready for handling the materials when delivered. When the construction work is fully under way it is expected that the field forces will comprise at least 500 Europeans and Americans. Labor will be recruited so far as possible from the countries through which the pipeline extends and it is estimated that not less than 6,000 nationals of these countries will be employed.

Iraq police at a post on the Euphrates.

It will be seen from the map on page 362 and the description of the route given above that the main portion of the line runs through desert country which is to a very large extent uninhabited and waterless, while the main elevation of the desert, being approximately 2,000 ft. above sea level, makes the climatic conditions difficult since extremes of heat and cold are experienced and at certain seasons of the year a heavy rainfall turns the alluvial portion of the route into a quagmire.

The numerous wadis to be crossed, which in the summer time are completely dry and form no great obstacle, in the wet season frequently become in a few hours raging torrents which are quite impassable to any form of transport. To negotiate the varying types of country encountered will necessitate the employment of several different kinds of transport, varying from the caterpillar type to the ordinary 30-cwt. truck.

Although as already stated the desert is in the main waterless, there are a number of wells existing along the route and these are indicated on the map. Water wells are now being drilled along both pipe routes, while it is intended to supply Station H 5 and the railhead at Mafrak by means of a pipeline from a plentiful supply which is available at Azraq. Tribesmen along the pipeline route will be allowed supplies of water from the wells.

Along the northern route there is a fair amount of water, but some difficulty will be experienced owing to the salinity.

The main pipeline is 12 in. interior diameter and 12¾ in. exterior diameter seamless steel tube, with short 10 in. interior diameter sections at points of high pressure. The joints in the line throughout will be electric welded. In all there are 1,180 miles of pipeline, amounting to approximately 120,000 tons in weight. The orders for this line have already been placed and have been distributed among British, French, American and German manufacturers. In order to overcome difficulties with expansion and contraction of the line, it will be buried throughout its length, and various types of constructional equipment will be required, such as caterpillar cranes for pipelaying, power trenching and back filling machines, air compressors and generating units for welding. For protective purposes the line will be coated, and probably wrapped as an additional precautionary measure.

One of the first pieces of constructional work to be undertaken is the erection of telegraph and telephone lines along the pipe route. All the necessary material for 1,000 miles of overhead line has been ordered, involving 25,000 steel tubular poles with cast iron bases, 25,000 timber cross-arms, 120,000 spindles and insulators, and over 4,000 miles of cadmium copper wire, together with the necessary stays, binders and instruments. Special towers 130 ft. high will be used for carrying the wires across the rivers Tigris and Euphrates. Power hole diggers will be used wherever possible for boring the holes for the poles.

Temporary buildings including offices, sheds, garages, workshops and stores are already in process of erection. In this connection 1,650 tons of steel work have been ordered.

A "road" through soft sand along the southern pipeline route.

It will be seen from the map that there are in all 12 pumping stations. These have been carefully sited as the result of a detailed survey and in conjunction with the consideration of pipeline throughput and pumping pressures. Stations K 1, K 2 and K 3 will be double stations, while H 1/H 5 and T 1/T 4 will be single stations.

The type of pumping equipment to be installed, in view of the scarcity of water, will be Diesel engine driven. There will be about 50 moderate-speed units of 500 b.h.p. each operating at somewhere between 250 and 350 r.p.m. Specifications, just issued, call for vertical, airless-injection engines which must operate on Iraq crude oil drawn off the line; but bids will also be considered if of the horizontal type. The pumps will be of the plunger type geared down from the Diesels, following general practice in long American pipelines.

Each pumping station will be complete in itself with the necessary tankage, offices, workshops and bungalow accommodation for the operating staff.

Both at Haifa and Tripoli the shore shelves very gradually and it is impossible for ocean-going tankers to approach within about a mile of the shore. The loading of oil, therefore, will have to be effected by means of submarine pipelines and the tankers will be moored out in the deep water. On shore the terminal facilities will consist of the usual administrative offices, workshops and stores, together with the tank storage necessary to supply flexibility, and powerful pumps to enable tankers to be loaded without delay.

The executive staff on the pipeline construction work is being supplied by the different groups forming the Iraq Petroleum Company, while the labor will be recruited locally as far as this is possible. Since the main part of the route passes over uninhabited country, the housing, feeding and transport of the large staff to be employed on constructional work presents numerous difficult problems.

Heavy going on a road in Palestine during the rainy season.

▼

Drilling Practice in the Kirkuk Field

DRILLING difficulties in the Kirkuk field, which is the only one thus far developed in Iraq to the point of important production, are not great. They arise chiefly from losing circulation. This, when it is required to drill deeper into the limestone, is overcome by circulating mixtures of mud, cement and sometimes Aquagel which seems to check loss of circulation.

With one exception the 32 wells thus far put down have been drilled by the rotary system with 6 in. and 4 in. drill pipe, fishtail bits, rock bits and core drills of the roller type.

The casing policy has lately crystallized into the following:

1. A surface string of 16 in. casing of about 200 ft., which acts as conductor, anchor, and also to shut off any surface water.
2. A water string of 11¾ in. which is set just above the so-called Transition Beds, which comprise alternating beds of anhydrite, silt-stone, and comparatively thin beds of limestone, the last sometimes containing oil.
3. A third string of 8⅝ in. is set in the top of the Main Limestone, which is the main oil reservoir.

All strings are cemented with an adequate quantity of cement by the Perkins Double-Plug system, and landed on Santa Fe type control-heads. No liners or perforated pipe are needed in the "pay" which, being limestone, does not cave.

Cores are taken where necessary, and where these show oil, tests are made by a flow tester through the drill-pipe.

When wells do not bring themselves in, circulating water to thin down the mud and to lighten the head is followed by swabbing, which serves to induce flow.

When brought in, wells are tested by flow through various sized beans and short distance of flow line, and the pressure drop recorded. Tubing was used in flowing the earlier wells, but latterly, owing to its being unnecessary, wells have been flowed through the casing.

Minimum closed-in pressures, i.e. the closed-in pressures with full column of oil (all gas bled off) vary according to surface level from 130 lbs. to 280 lbs. per sq. in.

With the exception of well No. 1, which flowed for 10 days through 8 in. casing and carbon head which was calculated to have given over 60,000 bbl. per day, production over long, continuous flows has not been made. Short tests, however, have shown a range from 3,000 bbl. to 20,000 bbl. per day.

The crude is light, with a Baume A.P.I. of 35 deg. to 36 deg.

The gas oil ratio is low, as usually obtains in limestone fields, and gives about 200 cu. ft. of gas to the barrel.

Completed well flowing into tank.

▲

Among the basalt boulders of the lava country 150 miles east of Haifa.

▼

Line passes over shoulder of extinct volcano, 180 miles east of Haifa.

Where the pipeline descends into the Jordan Valley. Cairn in foreground is 700 ft. below sea level.

Limestone outcrop on pipeline route, east of the Jordan.

Ruins of a colonnade at Palmyra. Pipeline route is one mile south.

Jordan river at pipeline crossing.

View of the terminal site near Tripoli, Syria.

Party leaving Haditha on pipeline survey.

Geological Features of Iraq Fields

Peculiarities of Structure and Desert Location Have Provided Some Unusual Features in the Work of Survey and Exploration.

By Chief Geologist, Iraq Petroleum Company

THE oil thus far found in Iraq is in a limestone of Miocene age, where uplift and erosion have brought that formation within reach of the drill. If nature had seen fit to make oil heavier than water, it might have gone to the low structural positions where it would have been beyond drilling depth. Hence, if only the world could be brought to realize its crying need of petroleum products, the oil industry might consider itself fortunate that oil tends to float on water.

Forty years ago it required, on the average, about 35 wild cat tests (say tests more than 20 miles from a producing well) to find a new pool. Now we have the general average score up to one success in less than 20 trials. In some remote countries we can do still better, but steel in some such places costs as much as its weight in gold to get it there and oil transportation costs are prohibitive.

Iraq seems to be between the extremes. The costs of mapping and exploration and of installations are huge and yet, with oil at prices that it has touched in the past, the country could possibly be developed profitably.

Aside from the heavy oil found at Qaiyarah, the Kirkuk pool is the only one thus far discovered in Iraq. Several other structures have had test wells. A few of these were not conclusive, but so far Kirkuk is the only known pool east of the Tigris.

Before the Great War reports of extensive seepages in Mesopotamia had been published and that was enough to cause oil companies to take some little interest in the country, but the first geological surveys of importance were by Pascoe of the Geological Survey of India in 1918–19 and by Noble and Evans in 1919–20. The next surveys began in the autumn of 1925 since which time the Turkish Petroleum Company, now the Iraq Petroleum Company, has had a dozen or more geologists working almost continuously, except that in the past year the force has been considerably reduced.

Iraq is a desert region bordered by Persia, Turkey, Syria, Transjordania and Arabia. It differs from some other desert regions in that much less than one percent of the area is occupied by drifting sand. It falls naturally into four principal parts as follows.

(1) The great stony desert west of the Euphrates where limestone outcrops abundantly and the surface rises from the Euphrates, which in Iraq is less than 500 ft. above sea level, very gradually up to a height of around 3,000 ft. at the extreme west corner of the country.

(2) The dry but partly irrigated alluvial and delta plain of the Tigris and Euphrates south of the latitude of Baghdad and east of the Euphrates. Near the middle of this area is the reputed Garden of Eden and it seems certain that a few thousand years ago, perhaps up to a thousand years ago, it was more largely, if not almost entirely under cultivation.

(3) A somewhat sandy and gypseous low upland lying north of the low alluvial plain and extending from a few miles northwest of Baghdad northwestward to the Turkish and Syrian frontiers.

(4) An area of hills and mountains along the Persian border in the northeast and about 75 miles wide. Occasional peaks in the extreme northeast rise to more than 10,000 ft.

Bitumen spring near Hit, Iraq.

In some respects anticlines in northern Iraq form hills similar to those in Los Angeles Basin.

The rainfall ranges from less than 6 in. in the south and southwest to about 20 in. in the northeast.

The average maximum daily temperature for July at Baghdad is 110 deg. Fahr.

Air view of one of the anticlinal mountains in northern Iraq. Note the steeply dipping bed.

and the average minimum for January, the coldest month, a little under 40 deg. Fahr. The extremes are 15 or 20 deg. above and below these temperatures respectively.

The coldest months have the greatest rainfall, June, July and August very often having none at all and September and October very little. Something like eight months of the year are very pleasant and, although cases of automobiles being stuck in the mud and great dust storms are frequent, still in half of the year one can go in some comfort almost anywhere in the country, except in the hills, by car, even across large areas where there are no roads.

Subsurface and chemical laboratory, Baba Gurgur.

The geological formations of Iraq range in age from Triassic to Recent. The late Tertiary formations are especially thick —15,000 ft. or more at a maximum— and it would seem as though, as in many other parts of the world, the earth's crust in Iraq had gradually sunk and the basin had been kept full, by washings from the mountains to the East, as fast as it went down. These washings became gradually coarser as time went on until recently boulders several feet in diameter have been rolled along by the streams but dropped not far from the base of the mountains.

Throughout Cretaceous time, the bulk of the deposits laid down were chemical (limestone, etc.), though there are thick deposits of carbonaceous muds, some of which may have been the parent rocks of some of the oil.

In the Tertiary, the deposits very gradually coarsened. The lower formations are mostly limestones with some sand and marl here and there. The middle Tertiary formations have a great deal of siltstone and even gypsum, the sea having begun to dry up. The upper have sand with finally a great deal of gravel. Apparently, the story recorded is one of downwarp of the basin at an increasing rate and, at the same time, uplift of the Persian mountains at an increasing rate, leading to erosion also at an increasing rate. The sea must have had access from time to time because there is more sulphur locked up in the gypsum and perhaps more magnesium in the dolomites than can have been derived from the region draining into the basin.

Structurally, as already indicated, Iraq is a basin or geo-syncline with anticlines in the east and north and irregular low structural features in the centre west and south. Some of the anticlines in the northeast are overthrust, at least on the surface, and along the Persian border are very great overthrusts or nappes.

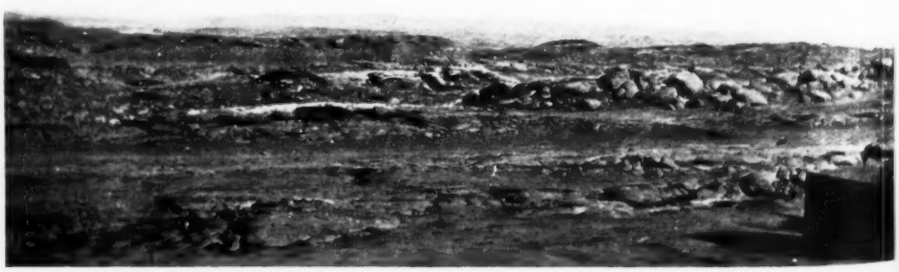
Exposures are comparatively good, as is common in somewhat hilly desert regions. Nevertheless, the structural geology is in places difficult, because the structure at the surface is not parallel with that underground. In several places the dips observable at the surface are all to the northeast and elsewhere there are little anticlines at the surface which have no parallel arches below. This is partly because of overthrust and partly because of salt flowage. Although no beds of rock salt are found at the surface still there is much underground, particularly in the formation known as the Lower Fars.

Perhaps most important for oil prospecting is the question of where are the crests maxima and where are the crests minima, since the strata exposed at the surface are commonly not parallel with those underneath. Not only are the axes

Field party constructing mounds to mark pipeline.

of the anticlines difficult to locate, but the highest parts along their length are even more difficult to determine. At Kirkuk, for example, there is only a monocline with northeast dips showing at the surface and yet there is a perfectly good arch or anticline underground, as has been found by drilling. For a time, the best of skill furnished a basis for mere estimates only as to where the high part of the structure lay and progress to-day is only sufficient to enable those who have worked many months on the problem to estimate the depth to the reservoir rock within 100–200 ft. of its true position. A very few years ago, it was common to estimate drilling depths 1,000 ft. or more in error.

Outcropping bids on faulted folds, Hassor structure.



Economic Aspects of Iraq Development

With Pipelines Conveying Its Output to Mediterranean Ports Near East Field Will Hold Strategic Advantage in Reaching Important European Markets.

LIKE a huge measuring worm the pipeline from Kirkuk to the Mediterranean will soon be threading its course across five hundred miles of desert waste. When it is completed, in 1935, a new factor will enter the world's oil market. This first double line of the Iraq Petroleum Company may presently be followed by another line from Mosul to Alexandretta for the plans of the B.O.D. Company which recently acquired a concession to work petroleum deposits west of the Tigris, contemplate the construction of such an outlet.

What will be the effect of this addition to the world's sources of oil supply? What rank will Iraq take among the producers and exporters of petroleum? Where will the oil of Mesopotamia be marketed and what will be its position in competing with the output of other established fields? These are questions that members of the petroleum industry in all parts of the world are beginning to ask. On their answers may depend important changes in the future course of the world's trade.

Nobody knows today how much oil Iraq will produce five years or ten years hence. That oil exists in considerable quantities within the folds that underlie the Kirkuk field has been demonstrated by the sinking of thirty-odd wells, practically all of which are generous producers. That oil exists in the near vicinity of Mosul was determined by German explorers a quarter of a century ago. There is still a great area that has not been fully explored nor subjected to the prospector's drill. It is safe to assume, however, that the able business men who comprise the companies now engaged in the development of Iraq's petroliferous areas would not invest millions of pounds in providing facilities for production and transportation and bind themselves to the payment of other millions to the Iraq Government unless they were satisfied that these millions could be recovered through the sale of oil.

An index as to minimum expectations in this respect can be found in the capacities of the pipelines now being laid or planned and in the terms of the contracts by which the companies have bound themselves. In the case of the Iraq Petroleum Company its contract calls for the production and shipment of not less than 3,000,000 tons annually. In the case of the B.O.D. the minimum requirement is 1,000,000 tons. This means that a quantity roundly equivalent to the export of the Soviet Union in 1931 is to be moved. The capacities set for the pipelines will permit a considerably larger annual movement. The lines now building for the Iraq Petroleum Company have an actual capacity of 31,025,000 bbl. or nearly 4,500,000 tons. The local requirements of Iraq, at least for some years to come, will be inconsiderable, so that the greater part of the oil produced will be available for export. To develop Iraq's oil resources and to convey the oil to tidewater requires a heavy investment in wells and pipelines but, apart from any question of its overhead charges, Iraq, in the opinion of experienced oil men, can produce as economically as any field in the world.

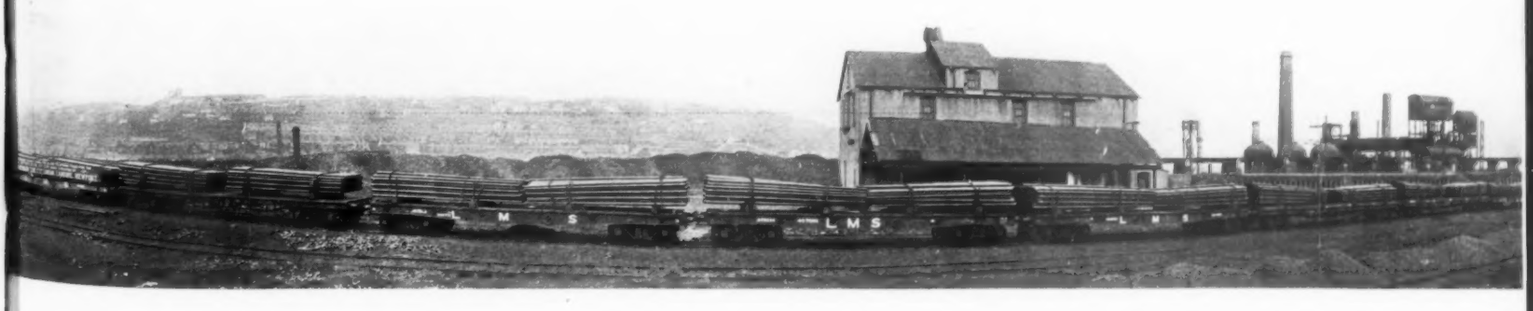
Aside from these considerations the oil of Iraq when delivered to tankers at Mediterranean ports will command an important advantage in reaching some of the principal consuming centres of Europe. A glance at the accompanying map and a comparison of relative distances from exporting areas to southern and western Europe illustrates this point. The strategic advantage of eastern Mediterranean ports in reaching important marketing centres in the Mediterranean is shown by the table of distances appearing in connection with the map on the pages following. For the purpose of this comparison distances from Tripoli are used but the relative position would be little changed by taking Haifa or Alexandretta instead.

While distance alone is not a controlling factor, especially where sea transport is involved, it becomes a consideration of importance where the differences amount to thousands of miles. In reaching Mediterranean markets, moreover, oil from Iraq, besides the saving in time and cost, will enjoy the added advantage, which might become of great importance in a time of crisis, that it does not have to pass through narrow straits or canals that might easily be blockaded. Shipments from the East via the water route must pass through the Suez Canal while those from beyond the Atlantic can enter the Mediterranean only through the Straits of Gibraltar and those from Black Sea ports must thread the narrow passages of the Dardanelles. Considerations of national policy relating to securing a flow of oil not easily interrupted undoubtedly have been a factor in influencing France to claim a share in the concession granted to the Iraq Petroleum Company and in inducing Italy to join in the B.O.D. development.

In relation to Western Europe, while the handicap of distance against other exporting fields and in favor of Iraq is not so great as it is in the case of Mediterranean ports it is still true that the terminals of Iraq's pipelines are much nearer to French, British, Dutch, Belgian, German and Scandinavian ports than are the producing districts of the Soviet Union, Persia, South America, Mexico or the United States, hitherto the principal sources of European petroleum supply.

Because of its relationship to important oil consuming nations, because of the relative economy of its production and above all because of its accessibility to leading European markets it is evident that once Iraq fields are brought into full production their output will find a place in international markets and other producers must make room for it.

Trainload of telephone poles leaving the works of British Manneswan Company for Iraq.



Map Showing Location of Iraq and Other Important

Comparative Distances Between Tripoli and other Producing Fields and Western European Ports.

(In nautical miles)

	Havre	London	Antwerp	Hamburg
Tripoli	2230	2395	2435	2685
Batoum	3540	3705	3745	3995
Constanza	3150	3315	3355	3605
Abadan (via Suez)	6390	6555	6595	6845
Singapore (via Suez)	8080	8245	8285	8535
Maracaibo	4235	4385	4430	4675
Galveston	4815	4965	5010	5255
Los Angeles (via Panama)	7555	7705	7750	7995

Producing Fields in Relation to International Markets

Comparative Distances Between Tripoli and Other Producing Fields and Mediterranean Ports

(In nautical miles)

	Marseilles	Genoa	Naples	Trieste
Tripoli	740	715	515	915
Batoum	1965	1870	1560	1740
Constanza	1575	1480	1170	1345
Abadan (via Suez)	4830	4740	4430	4615
Singapore (via Suez)	6525	6435	6125	6310
Maracaibo	4580	4735	4870	5540
Galveston	5430	5585	5720	6390
Los Angeles (via Panama)	7975	8130	8265	8935

Ropeway Carriers Across Iraq's Rivers

Lofty Towers Supporting Cables Will Convey Pipeline Materials and Supplies Above the Floods of the Tigris and Euphrates.

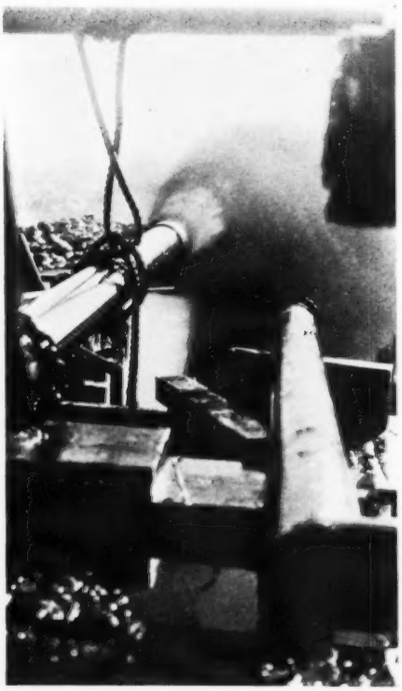
ONE of the great problems in the construction of the Iraq pipeline is that of transportation. Railway lines exist only in the eastern part of the country and consist of a narrow-gauge road extending from Basra, on the Persian Gulf, to Baghdad and from Baghdad to Kirkuk which is the eastern terminus of the pipeline. Another railway of standard gauge runs from Baghdad along the western side of the Tigris to Baiji, about 100 miles south of Mosul. Along the route of the pipeline there are neither railways nor improved highways and the tremendous tonnage of pipe and other supplies required for the line will have to be conveyed across the desert by lorries, much of it for distances of hundreds of miles.

A special difficulty is presented by the movement of material and supplies across the Tigris and Euphrates rivers. Owing to the great variation in the volume of water in these streams and the swift current when they are in flood, the use of floating equipment is a very uncertain undertaking. After careful consideration it was decided to make use of blondins or cableways to handle the bulk of the material although ferries will be used in addition for certain special loads and for any extra material when it is not advisable to interrupt the routine traffic of the blondins.

Both the Tigris and Euphrates have at all times a considerable current. When they are in flood, as during the Spring when the mountain snows are melting, the current reaches such a speed as to make the use of any type of floating ferry uncertain, if not impossible. On the other hand the blondins are independent of river conditions, always assuming, of course, that the bases of the towers are erected above the height of any possible flood.

The Tigris has not the same importance from a construction point of view as the Euphrates, as only a small proportion of the tonnage will have to cross this river, there being a railhead on either side, but a very large proportion of the material would be required to pass over the Euphrates and therefore a blondin of considerably greater capacity has been provided for crossing the latter.

(Continued on page 407)



One stage of shutting-in a big Iraq well.

Oil flowing from 1500 ft. depth on Kirkuk structure.

Present Status of Iraq Construction Work

Task of Placing Pipe in Position at River Crossings Will Begin September 15. Main Line Work Will Get Under Way at First of Next Year—Special Equipment Employed.

Surveyors of Iraq Petroleum Company at Work near Haditha.

ACROSS thousands of miles of sea and land, from widely separated parts of the globe, men, machinery and materials are moving to the great task of Iraq oil development. At the moment effort is being concentrated on the construction of the 1,180-mile pipeline which is to carry the output of the Kirkuk field to shipping ports on the shore of the Mediterranean. The tremendous task of carrying this great line of steel across a country where almost all the facilities of transportation, communication, housing, repair and maintenance have to be created involves a great variety of activities, aside from those directly applying to the laying of the pipeline itself.

The first sections of pipe to be put down are those required for the crossing of the Tigris and Euphrates rivers. The pipe to be used for this purpose was shipped from Europe in June and is now on location. Pipe fabricated in the United States, amounting to 8,000 tons, sufficient to construct about 100 miles of line, was shipped from American ports in July and was delivered at terminal points in August. This pipe is of 10¾ in. diameter and is intended for portions of the line where oil is to be pumped under heavy pressure. The remainder of the large size pipe, 12¾ in. outside diameter, which is to be used in building the main portion of the line will go forward in shipments from European ports extending over a period of many months.

The total amount of pipe required for construction of the line is 116,000 tons of which 100,000 tons is of the 12¾ in. size and 16,000 tons of 10¾ in. Of this quantity 49,000 tons is being supplied by French companies, 45,000 tons by British companies, 14,000 tons by German companies and the balance, as above stated, by American companies.

Since the pipe is to be electrically welded, a prerequisite to the commencement of construction work is the provision of portable welding outfits. These sets are being supplied by British and American firms including Wilson Welders and Peters. Twenty-eight units were shipped in August and the remainder are going forward in September. Forty compressors for use with these welders are being manufactured by the Ingersoll-Rand Company. The first of several welding crews, including foremen, sailed from New York on August 9 in order to reach Iraq in time to start work on September 15 when the laying of pipe for the river crossings is scheduled to begin. Other welding crews will follow in October.

Inasmuch as trucks, trailers and tractors must be relied upon for the entire movement of materials to be used a great number and variety of these are required for different branches of the work. Much of this equipment is already on the ground.

This American-built truck unit for Iraq has a hauling capacity of 40 tons.

Photo Courtesy of Marmon Herrington

Other units will continue to arrive up to November 1 when practically the whole of the transport facilities will be ready for service.

British lorries and American trucks, together with some of French make, will bear the main burden of conveying pipe and other materials across the rock-strewn wastes of the desert along the pipe-line routes. Goodyear and Dunlop tires of large size are being used on many of the vehicles.

Leading motor manufacturers have developed specialized transport equipment for operating over rough terrain in oilfield work and some interesting forms of this equipment are being utilized in the construction of the Iraq Petroleum Company's pipelines. One type of such specialized vehicle built by Scammell Lorries Ltd. is a 10-wheeled flexible machine capable of carrying 10 tons of steel pipe in 40 or 50 ft. lengths at a single load. A special patented arrangement of the rear axle permits one side wheel to be as much as two feet above its fellow on the other side, a feature of particular value in operating among the boulders along the western portion of the pipeline route. Other features prevent slippage on diagonally opposite wheels and enable the lorries to adapt themselves to the most uneven surfaces. A view of one of these lorries on the pipeline route in Trans-Jordania is shown on page 364.

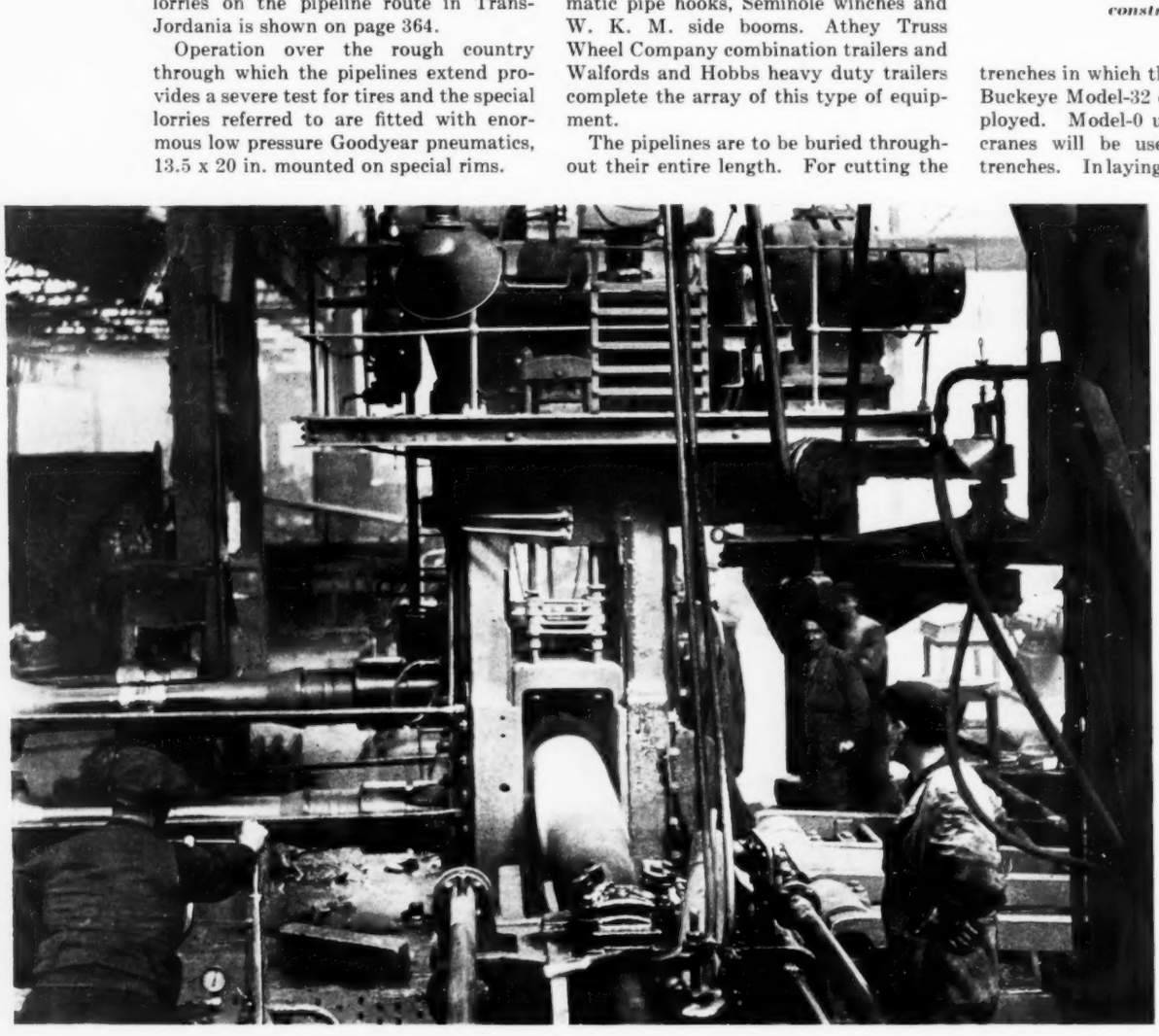
Operation over the rough country through which the pipelines extend provides a severe test for tires and the special lorries referred to are fitted with enormous low pressure Goodyear pneumatics, 13.5 x 20 in. mounted on special rims.

American manufacturers are contributing largely to the solution of the transport problems of the Iraq pipelines. The International Harvester Company is supplying no less than 64 trucks of various sizes and capacities. Of these 48 are of one and a half tons capacity and are fitted with Hobbs trailers. White 6-wheel trucks with a trailer and having a total capacity of 17 tons are also used in the pipeline work. One particularly interesting unit supplied by an American manufacturer consists of a heavy duty 6-wheel truck with a 4-wheel semi-trailer and a 6-wheel trailer forming a combination that will carry two sets of 40 ft. pipe at a single load. The complete unit weighs 20 tons and can haul a load of 40 tons at an average speed of 28.68 miles per hour on hard road. This unit is shown on page 373.

A large fleet of tractors and trailers supplements the operations of the trucks. They will be used to deliver pipe along the route and, with the aid of specialized attachments, to place it in the trenches when these have been prepared. Some of these are of British manufacture, built by Roadless Traction Ltd. and a large number are of Caterpillar and McCormick-Deering make, the latter being fitted with Trackson crawlers and many of them being supplied with 10 in. automatic pipe hooks, Seminole winches and W. K. M. side booms. Athey Truss Wheel Company combination trailers and Walfords and Hobbs heavy duty trailers complete the array of this type of equipment.

The pipelines are to be buried throughout their entire length. For cutting the trenches in which the pipes are to be laid Buckeye Model-32 ditchers are to be employed. Model-0 utility backfillers with cranes will be used in backfilling the trenches. In laying the pipe, McCormick-

French consignment of Iraq pipe be constructed at Escaut et Meuse pl



Iraq pipe under construction at Stewart and Lloyd's plant

Loading pipe on the BELPAMELA *of the Christen Smith lines for shipment to Iraq.*

Deering tractors fitted with W. K. M. side booms and Seminole front booms and winches will be used.

Preparatory to the actual delivery and laying of the pipe a great amount of preliminary work must be done. This includes the provision of discharging facilities at the terminals, the erection of shops, stores, hospitals and other necessary buildings, the location and piping of adequate water supplies, the stringing of telephone and telegraph wires and many other complementary activities.

Of these, the provision of water is not the least important. Sinking of water wells at various points along both pipeline routes is now going on. One of the accompanying illustrations shows an English Drilling rig employed for this purpose. This compact unit can be mounted on a lorry for conveyance to any point where it is desired to drill and can be set up ready for operation with very little difficulty. Five rigs were supplied.

Foundations must be dug for the pumping stations along the line and at the terminals, as well as for the tank farms and other structures.

Another enterprise of some magnitude which accompanies the construction of the pipeline system is the location of telephone and telegraph lines along the route. Much of the material required for this work is now on the ground and erection of the lines in Iraq and Trans-Jordania will begin in September. This work will be under the supervision of the respective governments which have the right to use the lines under certain conditions. American pole-hole power diggers were bought for the work.

When completed the telephone and telegraph system will be co-extensive with the pipeline. The principal operating station will be located at Haditha with terminals at Hassar, Tripoli and Haifa. There will be 11 intermediate stations. The wires will be mounted on 40 ft. steel poles. A trainload of these poles is shown in an illustration on a preceding page leaving the works of the British manufacturer for the journey to Iraq. Each pole will carry eight wires on two 4-way cross arms, the latter being of wood. The Tigris and Euphrates will be crossed by spans of 1,000 ft. each supported by towers more than 300 ft. high. A minimum clearance of 40 ft. above the river surfaces at high water will be provided.

At the present time active preparations are under way for setting the huge machinery of the full construction program under way by the end of the year and final preliminaries are being completed for the task of putting in the pipe at the Tigris and Euphrates crossings which as previously mentioned will begin September 15.

The pipeline surveys have been completed. Most of the station sites have been surveyed. Transport is being tested over rocky coastal mountain roads. Materials are being moved to terminal and railhead sites. A gasoline line is being run from Kirkuk to the Tigris River crossing. Construction of terminal structures and buildings at railheads is nearing completion. Erection of shops and other buildings at dumps should be complete from an operating viewpoint about December 1. Working gangs who are to lay the main sections of the pipelines are to leave the United States and England in October and work on these main lines will begin in earnest about the first of the coming year.

Cutting chill rings for the Iraq pipeline at the Louvroil and Recquignies plant.

To transport the vast amount of materials required for the Iraq pipelines from European and American ports to the terminals from which land operations are to be conducted is a large undertaking. Here again it has been possible to utilize special facilities created to meet this particular need. The large amount of pipe fabricated by Continental European firms is being handled from Antwerp and Dunkirk by the Christen Smith "Bel" fleet. These may be described as special weight-lifting motor vessels especially designed to accommodate heavy cargoes on their decks. Special loading equipment facilitates the movement of such cargo. An accompanying illustration showing the BELPAMELA loading at Dunkirk with steel pipe for Iraq, conveys a good impression of the manner in which the work is handled.

Shipments to Iraq from the United States which have been of less volume but of a varied character have been handled by the Export Steamship Corporation's American Export lines.

This English drilling outfit can be transported in a single five-ton truck.

For the reception of materials and equipment at terminal points along the pipeline routes where they will be used, suitable arrangements have been made at Haifa and Tripoli. At the former port, landing facilities including docks are practically complete. At Tripoli cargo is discharged to lighters owing to the shallowness of the shore approaches. Terminal buildings at both ports are near completion.

Conditions surrounding the construction of the pipelines which are to join Iraq's oil fields to the Mediterranean differ from those encountered in other pipeline projects in so many respects that it is impossible to estimate accurately the precise length of time that will be required for completion of the undertaking. As indicated by the facts already set forth, however, the work is being pushed at full pressure and will go forward as rapidly as expert direction, up-to-date equipment and a large laboring force can push it. The special problems presented by desert conditions and unusual transport requirements have been carefully studied and the best available engineering skill and experience have been drafted for the various branches of pipeline and other construction.

International Harvester truck in the lava country south of the Iraq pipeline.

Native labor loading section of casing on a truck in Iraq

B. O. D. to Develop Second Iraq Field

British Company with Strong International Connections Holds Concession for Area West of Tigris Including Quiyarah Wells. Plans Pipeline to Mediterranean.

With the revision of the agreement between the Government of Iraq and the Iraq Petroleum Company by which the latter undertook to confine its operations to the territory east of the River Tigris the way was left clear to the Government to make separate arrangements for the development of petroleum resources in other parts of the country. By a contract officially ratified in May 1932 a concession covering about 40,000 square miles lying to the west of the Tigris was granted to the B. O. D. (British Oil Development) Company, Ltd., which for several years previously had been seeking authority to enter Iraq.

Terms of this concession are in general similar to those embodied in the earlier agreement with the Iraq Petroleum Company. It comprises "all the lands of Iraq situated west of the Tigris River and north of the thirty-third parallel of latitude." It runs for a period of 75 years at the end of which time the properties are to revert to the Government. The company is allowed seven years in which to survey and make selection of areas for exploitation but is required to begin drilling within eighteen months from the date of the contract with a minimum of three rigs and to have at least nine rigs in operation within twelve months after oil has been struck. Until commencement of regular export the company is required to make annual payments of dead rent to the Government, beginning January 1, 1933, of £100,000 gold, rising by £25,000 yearly until the amount reaches £200,000. Thereafter the Government is to receive a royalty of four shillings gold on petroleum produced and annual payments by way of royalty are to amount to £200,000, requiring a production of not less than 1,000,000 tons yearly. This obligation is dependent upon the provision that the resources of the defined area permit the production of 1,000,000 tons and a further provision is made that if in any year the royalties due amount to less than £200,000 the difference shall be recoverable by the company through increased shipments in subsequent years. The Government is entitled to take at well head 20 percent of the oil produced and on this quantity of course no royalty is to be paid.

Sir Edward Mountain.

After 20 years the royalty is to be increased or decreased in proportion as the profit or loss of the company shall be greater during the five years immediately preceding than in the fifteen years previous. Similar readjustments are to be made subsequently at the expiration of each ten-year period of the contract.

In the territory covered by the B. O. D. concession are included seven completed wells at Quiyarah and these wells, including all plant and equipment in connection with them, become the property of the company free of cost. The company undertakes to build and operate a pipeline capable of handling a minimum of 1,000,000 tons yearly or to make other arrangements for transporting that quantity of oil. It is granted immunity from all taxation, state or municipal, on payment to the Government of 3½d per ton of oil produced up to 4,000,000 tons annually, increasing to nearly 5d per ton on production above that figure. In general the terms are so framed as to give the company the greatest possible freedom of action and the contract is notably lacking in irksome restrictions.

One article of the agreement definitely establishes the British status of the company by providing that it shall remain a British company having its principal place of business within His Britannic Majesty's dominions and that the chairman at all times shall be a British subject.

Although corporeally British, as its name and the just-quoted provision of its contract indicate, the B. O. D. is really an international organization quite in the same degree as the Iraq Petroleum Company though composed of different and entirely independent groups. Organized by prominent British business men it has expanded to include powerful Italian, French and German interests.

Sir Edward Mountain, chairman of the board of the B. O. D., though not heretofore identified with oil company financing, is one of the prominent figures in the insurance and financial world. He is chairman and managing director of the Eagle, Star and British Dominions Insurance Company, Ltd., which has made a remarkably successful record in recent years. Another British director is Sir Edward Manville, chairman of the Phoenix Oil and Transport Company and a director of the Sealand Petroleum Company. Others are Lord Wester Wemyss, William R. Brown, a member of the board

Quiyarah No. 1 near Mosul in the territory of the B. O. D.

of the British Union Oil Company, and E. C. Simmons, partner in a prominent London law firm.

Of the other national groups represented in the B. O. D. the most conspicuous in petroleum affairs is the Azienda Generale Italiani Petroli (A. G. I. P.), the company controlling leading Italian refineries and in which the Italian Government is interested. It has three directors on the board, Prof. Alessandro Martelli, Gr. Uff. Arnaldo Petretti and Comm. Ing. Vittorio Amoretti. Participation of this strong Italian group in the affairs of the B. O. D. is especially important from the market angle, since Italy is a large importer of petroleum and is especially desirous of obtaining a dependable supply of crude for its refineries.

French interests in the company are represented by the banking group of Paul Girod who is a B. O. D. director. German participation is provided through the Krupp interests which are represented on the board by Thomas Brown. These continental affiliations add an element of great strength to the B. O. D. in connection with the future marketing of its product since Italy, France and Germany are all within convenient access of the Mediterranean port from which B. O. D. oil will be shipped and all are anxious to enlarge their refining operations and to import more of their requirements in the form of crude. With these connections it probably will be possible for the B. O. D. to find ample outlets for its crude oil production and to avoid the necessity of erecting refineries except possibly small plants to supply its own needs and other local requirements. In the beginning at any rate it will be the policy of the company to avoid extensive refining construction in view of the present trend in the development of the internal combustion engine and the possibility of a radical change within the next few years in the character of its fuel requirements.

B. O. D. begins its career with the very considerable advantage of coming into possession of several wells already proved. These are located at Quiyarah a short distance south and west of Mosul. The first of these wells was put down by German interests under a concession which they obtained from the Turkish Government when it controlled this territory. Others were drilled by the Turkish Petroleum Company—now the Iraq Petroleum Company—under its original agreement with the Government of Iraq.

These wells are relatively shallow. Oil was encountered in the first well put down in this district at a depth of only 150 ft. Later wells developed oil at from 800 to 1,200 ft. although the possibility exists that deeper drilling may uncover greater deposits. The oil now being produced is heavier than that of the fields east of the Tigris and in Persia. In its general characteristics it more nearly resembles the output of the Russian fields that lie to the north and west of the Mosul district.

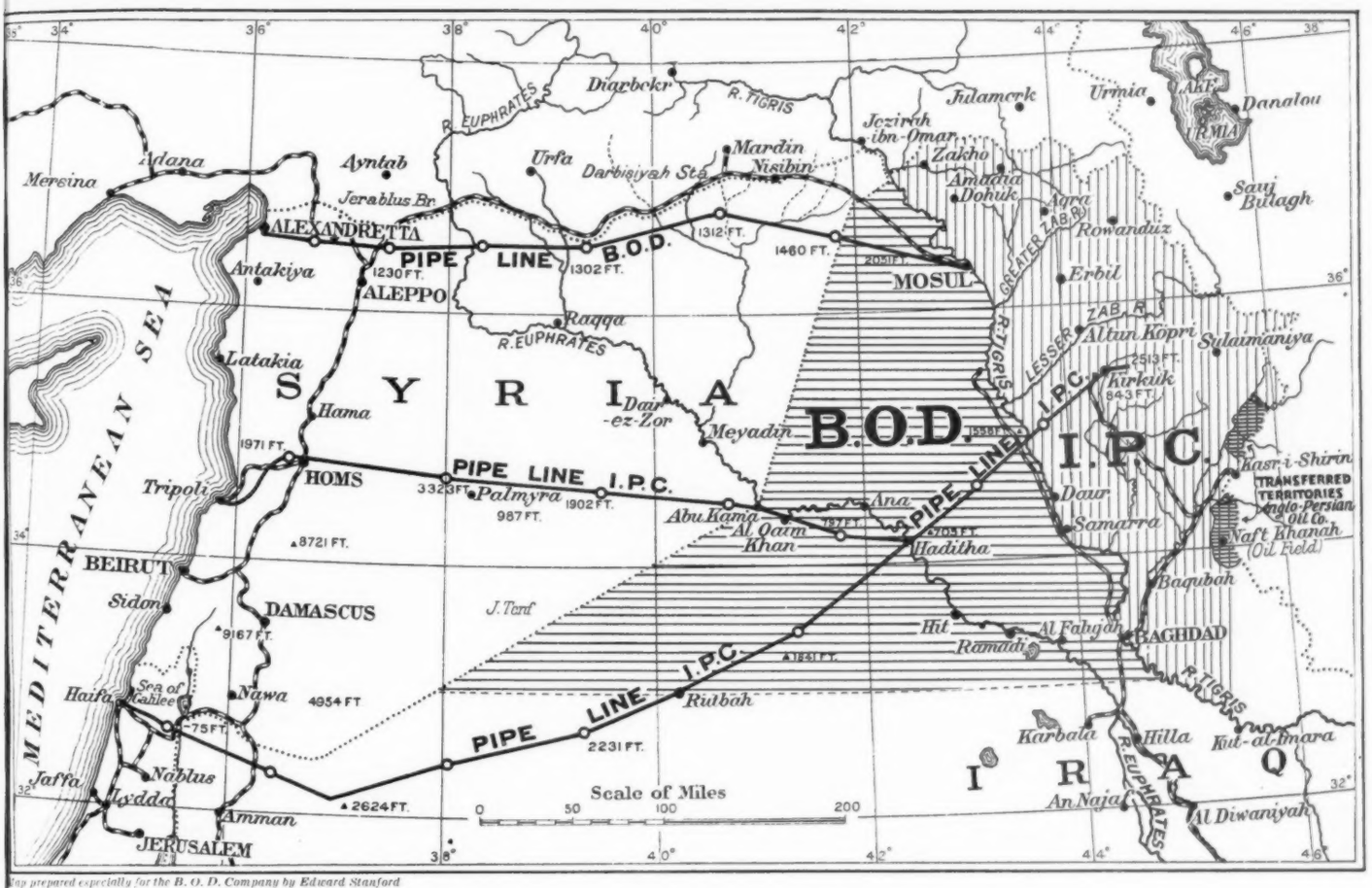
Possession of this field probably will influence the B. O. D. to bring it first into production by erection of the necessary storage and equipment, construction of a pipeline from Quiyarah to the deep water harbor of Alexandretta on the Mediterranean, a distance of about 500 miles, and the establishment there of terminals and other necessary facilities for the handling and shipping of cargoes. The obvious route of this pipeline, which is planned to be of 12 in. internal diameter, is suggested by the railway line between Mosul and the coast which follows an easy course through level country and provides facilities for the convenient transport of material, for telegraph, telephone and postal services, storage depots and an excellent base for subsequent control and supervision of maintenance. Practically every part of such a pipeline, which will be laid above ground on firm soil, will be within a day's journey of one of the two first headquarters of the company. The existence of the railway will enable the expenditure on road construction to be kept to a low figure and will reduce materially the investment in vehicles for transport.

While this program is being carried through the company, in accordance with the terms of its contract, will conduct the survey and exploration of other parts of its area and its further course will be determined to some extent presumably by the results of this investigation. Definite plan of procedure is to be determined within the next few months but probably will adhere more or less closely to the above outline.

Confidence of the B. O. D. management in the development of extensive supplies of oil within its concessions is indicated by the size of the proposed pipeline which will have a yearly capacity much in excess of the 1,000,000 tons which is the minimum quantity on which the contract with the Iraq Government is based.

Assuming the development of an adequate volume of production those interested in Iraq consider that it possesses a marked advantage through its location in relation to important markets. Oil delivered on the eastern shore of the Mediterranean will enable the countries

Arabs on the move in the desert west of the Euphr



Map prepared especially for the B. O. D. Company by Edward Stanford

Map showing location of Iraq oil concessions and proposed route of the pipeline to be built by the B. O. D. Company.

bordering that sea to be independent of supplies from more distant sources which can reach them only through passages—either the Straits of Gibraltar, the Dardanelles or the Suez Canal—which might be blocked in a time of emergency.

As a glance at the map reveals, the situation of Iraq, with its projected pipelines, permits an immense saving in sea transport on the carriage of oil from the new field to Mediterranean countries and their hinterlands. Average distance from Alexandretta to Mediterranean ports is not more than 1,200 miles, while from Persia, the Gulf of Mexico, the Caribbean and California, the present sources of supply other than the Black Sea, the average distances are not less than 4,500 miles, 7,500 miles, 6,700 miles and 10,000 miles respectively. In comparison with Constanza, Batum, Taupse or Novorrosisk the difference in distance is not so great but here again Iraq oil will have the advantage of an open route that cannot be blocked to interfere with transport.

Considering that the natural geographical market for Iraq oil contains a population of nearly 200,000,000 whose petroleum requirements under normal conditions should not be less than 40,000,000 tons of crude per annum it will be seen that the output of this field should have no difficulty in finding a place in markets which are either non-competitive or in which it enjoys a decided strategic position.

▼

PRODUCTION of crude oil in Italy during the current year is likely to be nearly double the 150,000 bbl. produced in 1931. As a result of the increased output Italy's petroleum imports decreased nearly 40,000 bbl. during the first quarter of 1932 compared with the same period last year.

▼

INCREASED crude oil production in Italy will possibly mean refinery expansion before long.

ACCORDING to one important Roumanian oil authority Roumania has reached the peak of her crude oil production, and a gradual decline is likely to set in. Sir Edward Manville of the Phoenix Oil and Transport Company, Ltd., however, says:

> It is gratifying to note that a further year's experience of Roumania's oil resources indicated that these are large indeed, and each year shows generally increased oil reserves. In the particular case of the Phoenix Oil and Transport Company, the experience remained that at the close of each year the company has had greater proven reserves than at the beginning, notwithstanding the large quantities of oil extracted. Meotic sands opened up by deep well drilling have proved increasingly extensive and prolific, and although the wells are now of great depth, often exceeding a mile, so improved are the methods of drilling and equipping that these deep wells have involved only a moderate cost and are completed in less time than used to be the case with the earlier wells of half the depth.

Derrick erected by Germans at Quiyarah.

Roumanians Promise Reply by September 15

General Meeting of Roumanian Industrialists Greets Proposed Conditions of Paris Parley with Satisfaction but Asks Additional Month Before Final Agreement.

BUCHAREST, AUGUST 17

ROUMANIAN Oil Industrialists at a general meeting toward the middle of August agreed to ask for further time before committing themselves to a final agreement covering petroleum exports from Roumania. Satisfaction was expressed with the outcome of the International Oil Conference recently in session at Paris and all indications point to the fact that the Roumanians are anxious to join the agreement with the international oil companies represented there. Due to the absence of many important officials from Roumania at this time and to the number of important details that must be worked out before the agreement can be ratified, the Roumanian companies feel that another month will be necessary before giving their final answer. This will carry the matter over till September 15, by which time the Roumanians are expected to give a favorable answer regarding their participation in the agreement covering export markets of Europe.

Reports in the Roumanian daily press gave the substance of the contemplated agreement. Mr. Osiceanu chairman of the Roumanian delegation told his associates that the Conference opened with a proposal from the International Oil Group that Roumania should reduce its production in the same proportion as it had been reduced in other countries plus 16 percent. The Roumanian Delegation thereupon refused to undertake negotiations on that basis so the International Oil Group went on to propose that Roumania should accept a guarantee that its exportations during the coming years should be at least equal to those of 1929 in all countries to which it had exported oil. The Roumanian Delegation was again obliged to refuse and proposed that instead of taking 1929 as a basis for negotiations the period comprised between July 1, 1931 and June 30, 1932 should serve for the purpose. After much discussion the latter suggestion was accepted.

Mr. Osiceanu underlined the fact that the difference between the quota originally suggested by the International Oil Group and the one proposed by the Roumanian Delegation only made a difference of 64 percent.

It is understood that in the eventuality of consumption increasing or diminishing in any of the countries to which Roumania supplies products, its quota would be adjusted in consequence.

The Roumanian press reports concerning the quantities of oil the International Oil Group proposes to take over directly from the Roumanians are slightly confusing and vary considerably. It is understood the international group has undertaken to buy up the equivalent of 43 percent of the total quantities exported by Roumania between July 1, 1931 and June 30, 1932 at prices quoted at Mexican Gulf ports. In this connection Mr. Osiceanu drew the attention of his colleagues to the fact that prices f.o.b. Mexican Gulf have been much higher than prices f.o.b. Constantza for some time past, and that this fact alone would bring immediate relief to the Roumanian oil industry, if the agreement were ratified.

It is, however, stipulated that should prices quoted on other markets be higher than those quoted at Gulf ports, these would be brought into line with the former to the advantage of the Roumanians. The same arrangement holds good where the International Oil Group is concerned: that is to say, that in the case of the Roumanian companies (having signed the agreement) selling to other clients at a lower price than those paid by the group these prices would be levelled down to the advantage of the group.

This clause is not, however, to be enforced in the case of a company quoting an inferior price to an affiliated company. It only holds good when prices are quoted for a concern in no way connected with the company.

Mr. Osiceanu pointed out that the proposed agreement makes allowances for some countries who wish to encourage the development of a refining industry, by granting preferential tariffs for imported crude oil. In such case, prices would vary according to the quality of the oil exported.

If it so happened that Roumania was unable, for some reason or another, to export crude oil, the Roumanian distributing companies abroad would then receive such quantities of products from the International Oil Group, as were necessary to them, in exchange for equivalent quantities of oil which would be delivered to the group in Roumania.

It is stipulated that the Roumanian distributing organizations abroad are to come to an agreement with all the organizations belonging to the International Oil Group in the countries in which they may happen to find themselves together.

Finally it was agreed that if ever the Soviets obtained more favorable conditions from the International Oil Group in their future negotiations, the same conditions would automatically be applied to the Roumanian oil industry.

(This information is in no way official and must therefore be treated with the greatest reserve as it emanates from the Roumanian daily press. There is doubtless a great deal of truth in it, but the Roumanian Delegation still thinks itself sufficiently bound by secrecy neither to corroborate nor deny the news.—Editor.)

The additional month requested by the Roumanians will be spent in deciding three main problems confronting the industry in that country. The first of these problems consists of the necessity for a careful revision and repartition of export quotas among the principal exporting companies operating in Roumania.

The second subject claiming the attention of oil company representatives in Roumania is the restriction of production to actual domestic and export requirements. This problem has brought out the usual two trends of opinion witnessed in other countries confronted with the same necessity. A strong body of opinion advocates letting production take care of itself until the inevitable functioning of economic law brings crude production into balance with demand. A second, more conservative, school believes that

(Continued on page 406)

Modern Alchemy in Petroleum Refining

Hydrogenation Approaches Medieval Dream of Changing the Substance of Matter. Standard of New Jersey Reveals Details of Two Years' Successful Hydrogenation. *By Joel H. Hirsch*

HYDROGENATION, the newest, the most versatile, and until now the most carefully guarded process in the petroleum industry, has, after five years of intensive development, finally reached the stage where its sponsors feel justified in placing some of its products on the market and in making public for the first time detailed and authoritative information on its operation. On August 9th about 100 representatives of newspapers, oil and chemical trade journals, and other interested organizations were guests of the Standard Oil Company of New Jersey on an inspection trip through its Bayway, N. J., hydrogenation plant, which has just completed two years of full scale operation. A pamphlet entitled "Hydrogenation—A Revolution In Oil Refining—Its Present Scope and Future Possibilities", which was presented to members of the inspection party, comprises what may be characterized as the first official statement on the practical, commercial uses of the process. This bulletin unquestionably contains the most complete information on the process, its economics, products, and engineering features, yet made available from official sources.

So revolutionary is hydrogenation in its operation and processing possibilities that, although little authoritative information has been available, the process has been watched with mingled interest and apprehension since its inception. Always conservative in its public statements, the Standard Oil Company of New Jersey has been reluctant to give out information on hydrogenation or express opinions which might prove disturbing to the industry and which might, in the light of later research, be unjustified. The Company's official silence on the subject and its present opinion are aptly explained in the Foreword of the pamphlet:

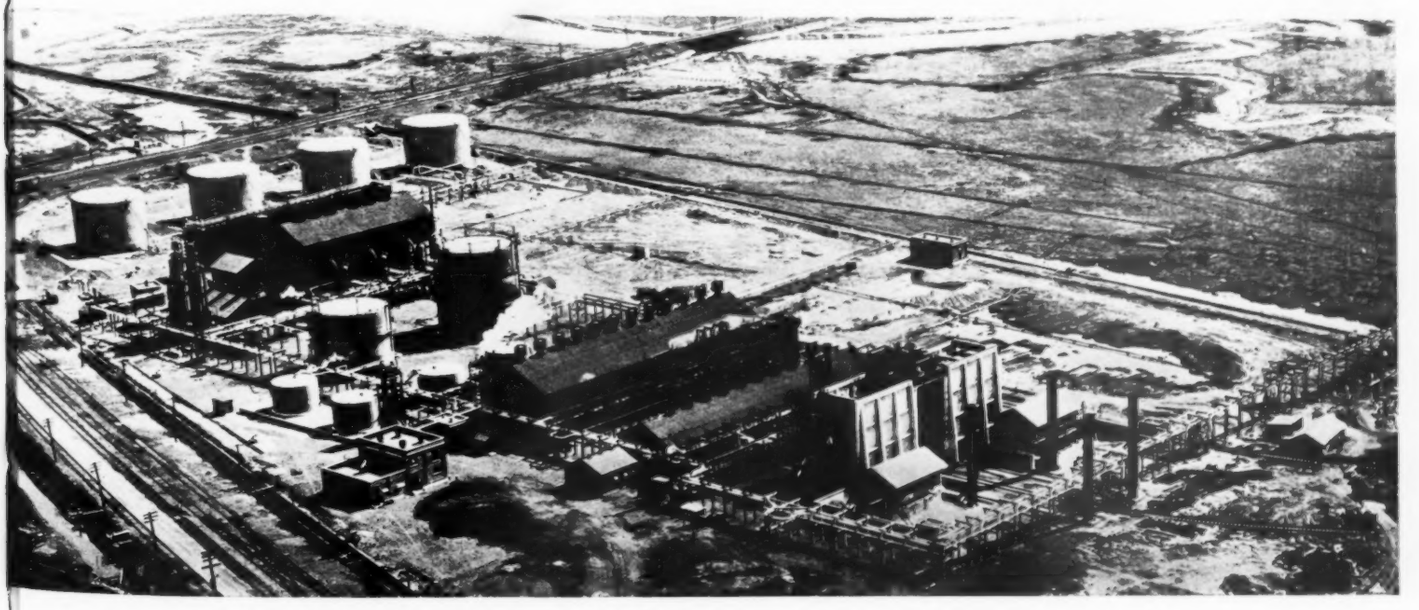
> The hydrogenation plant of the Standard Oil Company of New Jersey at Bayway, the first of its kind in the world, has now completed its second year of operation. During that time, despite natural curiosity and widespread speculation as to the possibilities of the process little detailed information has been given out. Although hydrogenated products had actually been produced since 1927 in the Company's experimental plants at Baton Rouge and Bayway, it was felt that no definite predictions should be made until the process had been given a thorough trial on an extensive commercial scale.
>
> The past two years of commercial operation have shown that the effects of hydrogenation are considerably more far-reaching than was at first realized. There is no longer any doubt in the Company's mind as to just what the process can do. It is for the purpose of making such information public that this folder has been prepared.

Under what price conditions will hydrogenation be on an economically competitive basis with other refining processes manufacturing substantially the same type of products? This is the question uppermost in everyone's mind when considering the hydrogenation process. While no specific cost data is forthcoming at this time, the question is answered in part at least by the Company's statement:

> It has been definitely shown that it is possible to produce hydrogenated products on a price basis at least equal to that of products made by the older refining methods.

This statement coupled with the fact that between 1,500,000 and 2,000,000 bbl. of hydrogenated products were produced at Bayway during the past year and the decision of the Company to enter the market with certain hydrogenated derivatives should do much to allay skepticism. While it is true that some applications of the process must await higher crude oil prices to become economically feasible, there are a number of commodities to which the process is peculiarly adapted, even under existing market conditions.

Six different hydrogenated products have recently been or are about to be placed on the market by the Standard Oil Company of New Jersey and its domestic marketing associates, Standard Oil Com-



General view of Jersey Standard's hydrogenation plant at Bayway, N. J.

pany of Pennsylvania, Standard Oil Company of Louisiana, and Colonial Beacon Oil Company. Among these commodities are a special automobile lubricating oil, a line of hydrogenated solvents for the paint and varnish industries, a safety fuel for aircraft and motorboats, a substitute for benzol, which has the blending characteristics of a 110 octane number naphtha, a special aviation engine oil, and a superior kerosene. These commodities will be manufactured in existing plants at Bayway and Eaton Rouge, La., until future plants may be constructed.

A new motor oil, which is shortly to be offered to the public under the brand name of Essolube, is the most important product of the hydrogenated line yet developed. This oil is said to be of superior quality and better adapted to modern automotive lubrication in five important characteristics. Salient features claimed for the new oil, which has until now been known to the industry by the class designation of hydro-lube, are a high viscosity index, low pour point, resistance to oxidation, low carbon formation, and low consumption and evaporation losses.

Another application of the process which bears considerable promise for the immediate future is the manufacture of technical solvents. These solvents are expected to find a market in the following principal fields:

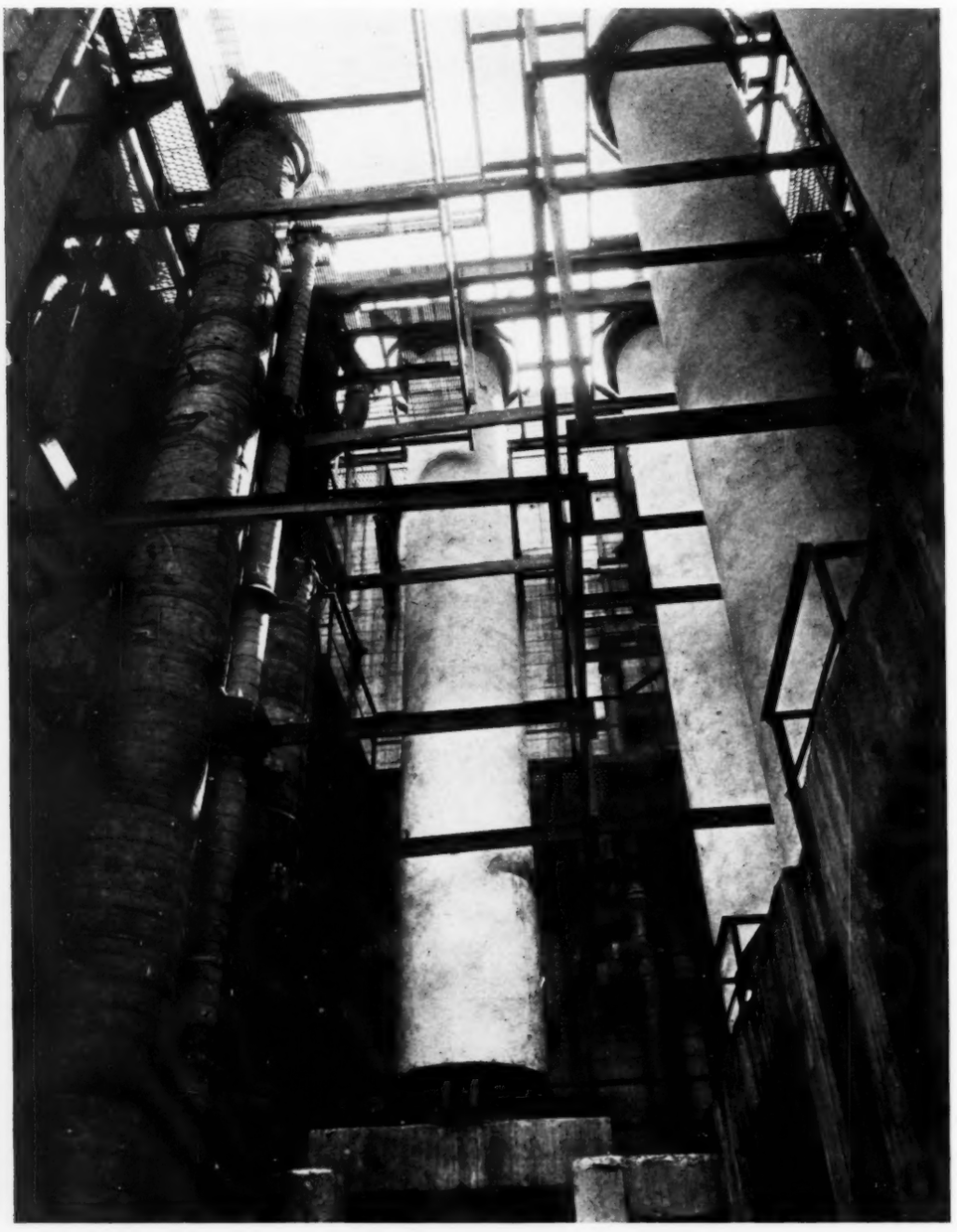
1. Paint and varnish
2. Lacquers
3. Synthetic finishes
4. Rubber products
5. Artificial leather
6. Special uses

Special uses for these solvents comprise operations where a combination of high solvent power and controlled evaporation rate is essential.

The following statement is made with regard to this new line of products:

> Hydrogenated solvents have been found to be superior to other petroleum solvents and possess characteristics superior to some of those of the coal tar products with which they will be in natural competition.
>
> Application of the usual solvents to the manufacture of paints, varnishes and lacquers is standard practice in this industry and always subject to improvement. An important trend, however, in the field of protective coatings is the introduction and growing importance of the various finishes based on synthetic resins. Features of this type of coating are toughness, elasticity, resistance to weathering, ease of application and resistance to oil, gasoline, and alcohol.
>
> No adequate supply of satisfactory solvents has heretofore been available for these resins. The hydrogenated solvents will make possible further exploitation of these new finishes and may assist in revolutionizing the field of protective and decorative coatings of which automobile and furniture finishes are principal factors.

Behind the seven-inch alloy steel walls of these 40-foot towers hydrogen and oil at 3600 pounds pressure and 750 to 1000 degrees temperature are being forced through the packed catalyst. Molecules of the oil are literally torn apart here and reformed according to product specifications.



A new safety gasoline, which will greatly minimize fire hazards, is being manufactured by hydrogenation and is already on the market. The secret lies in the fact that the flash point of this safety gasoline is over 105 deg. Fahr., the temperature generally recognized as the dividing line above which danger of fire from leakage, spillage or the formation of an explosive mixture with air is negligible. So high is the flash point of this gasoline that lighted cigarettes and matches are extinguished when submerged in it. Although practically free from danger of accidental ignition, it is equal or superior to the best aviation gasoline in octane number and operating efficiency. Although not suitable for automobile engines at present because of the starting difficulty, this new gasoline undoubtedly will find wide use in the airplane and motorboat fields where fires from broken fuel lines and explosions resulting from gasoline vapor under closed hatches are an ever-present menace.

A special aviation engine oil, another product of hydrogenation, is undergoing extensive tests and will shortly be offered on the market.

A substitute for benzol, which has blending characteristics of a 110 octane number naphtha, or higher than pure iso-octane used in determining octane numbers, is one of the most interesting products which can be manufactured by hydrogenation. Although it has not yet been produced on an extensive commercial scale, it is believed that this material has great potentialities for the export trade, where it may be used for anti-knock blending purposes.

The demand for kerosene, attributed chiefly to the widespread growth in the

use of range oil burners, was so great at one time during the past year that the Company was obliged to turn its hydrogenation plant over to the exclusive manufacture of this commodity for five months, supplementing the regular refinery output.

The hydrogenation plant at Bayway, operation of which is diagrammatically depicted in the accompanying flow chart, really consists of two units, each housed in a separate concrete stall, shown in the accompanying illustration. Each unit has a daily charging capacity of from 2,500 to 5,000 bbl. depending upon the type of charging stock and the products being manufactured.

In the production of Essolube the capacity ranges from 2,500 to 3,500 bbl. per day, varying with the charging stock. When making anti-knock gasoline it is possible to attain a total feed charging capacity in the neighborhood of 5,000 bbl. per day.

The manufacture of hydrogenated lubricating oils is largely a liquid phase operation, the oil being charged into the reaction towers in the liquid form at a temperature approximating 800 deg. Fahr. Production of anti-knock gasoline, on the other hand, takes place in the vapor phase at a temperature around 1,000 deg. Fahr.

Hydrogen for the process is derived from cracking coil gas. At present about 2,000,000 cu. ft. are manufactured per day, although the plant is capable of generating from 6,500,000 to 7,000,000 cu. ft. per day.

Scrubbed cracking coil gas, treated for removal of sulphur compounds and mixed with steam, is fed to the reforming furnaces, where at a pressure of about 15 lb. per sq. in. it passes through catalyst packed tubes heated to about 1,800 deg. Fahr. Through the reaction of the hydrocarbons in the gas with steam a mixture of hydrogen and carbon monoxide is produced.

Still more steam is added to the mixture leaving the furnaces, and in the second phase of the process, known as conversion, hydrogen and carbon dioxide are made. The gases pass up through catalyst-filled trays in a tower maintained at a temperature of about 850 deg. Fahr.

The gaseous mixture leaving the converter, composed of about 79 percent hydrogen, 20 percent carbon dioxide, and one percent unconverted hydrocarbons and other gases, is cooled in a coke-packed cooling tower and taken to the hydrogen gas holder.

The gas from the holder passes to four-stage compressors where it is raised to the hydrogenating pressure of 3,600 lb. per sq. in. Between the second and third compressor stages the gas is stripped of its carbon dioxide content by passing the mixture through packed scrubbing towers counter-current to sea water, where at a pressure of 240 lb. per sq. in. the carbon dioxide dissolves and the composition of the gas is reduced from about 20 percent to less than 0.6 percent carbon dioxide.

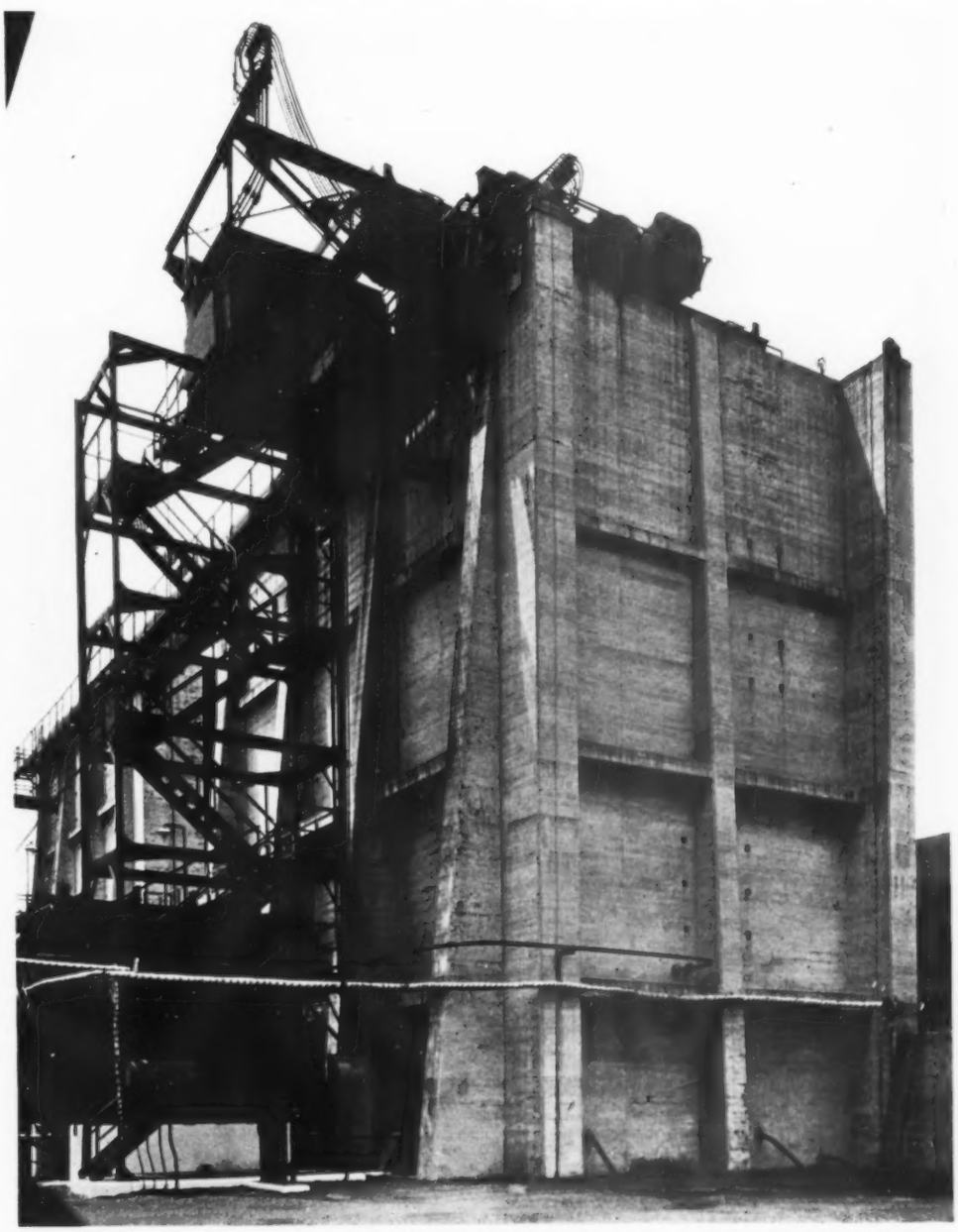
The feed stock to be hydrogenated is pumped from storage to high pressure feed pumps in which it is raised in a single step to the system pressure of 3,600 lb. per sq. in. The charging stock and hydrogen, both at the same pressure, are finally brought together through a T-connection and are then ready for the final step.

The oil-hydrogen mixture is first preheated in heat exchangers located inside the concrete stalls, in which it passes counter-current to hot hydrogenated products coming from the reaction chambers. The mixture is then raised to the reaction temperature in a gas fired coil quite similar to the conventional tube heaters.

In the reaction chambers, of which there are four in each unit, and which are shown in the accompanying illustration, the mixture passes upward through the packed catalyst and the oil and part of the hydrogen unite. Reaction is exothermic, so that a relatively small amount of heat need be supplied by the coil.

The reaction products pass out the top of the chambers, through the heat exchangers and a cooler to a release drum. Here the gas and liquid are separated, the liquid being released into a low pressure separator maintained at a pressure of about 200 lb. per sq. in. Any gas remaining at this stage is drawn off and sent to the burning line, while liquid products are scrubbed free of hydrogen sulphide and pumped to storage.

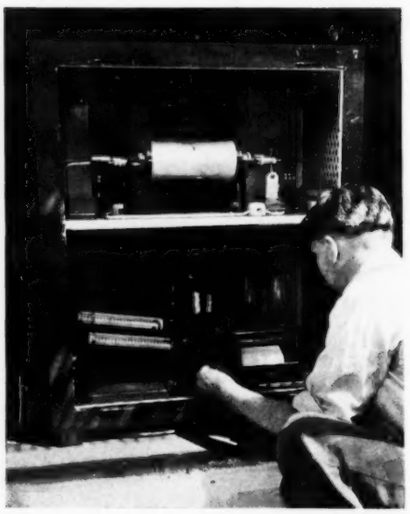
The massive concrete stalls which enclose the heavy steel reaction chambers where hydrogenation actually takes place. Notice the great 150-ton electric crane, used for removing the reaction towers when necessary.



Excess hydrogen from the high pressure release drum is scrubbed free of unconverted hydrocarbons, with which it tends to become contaminated, passed through a separator, followed by a booster pump, where its pressure is raised to that maintained on the system and is then ready for recycling to the hydrogenating equipment.

Because of the extremely high operation pressure maintained in the high pressure side of the plant, unusual attention has been given to safety considerations in its construction. The 40 ft. reaction chambers have walls of special construction seven inches thick. All piping in the high pressure side of the plant is of unusual thickness. Leak proof joints are effected by drawing two accurately machined ends together against an alloy steel gasket. Machining of pipe ends and gaskets is so precise that even when the flange bolts are only hand tightened the joints will withstand the 3,600 lb. per sq. in. system pressure.

Because of the explosiveness of hydrogen-oxygen mixtures the greatest precautions have been taken. The hydrogen gas holder is fitted with low and high pressure alarms, which sound in the control room whenever there is danger of hydrogen escaping into the atmosphere or inward leakage of atmospheric oxygen.



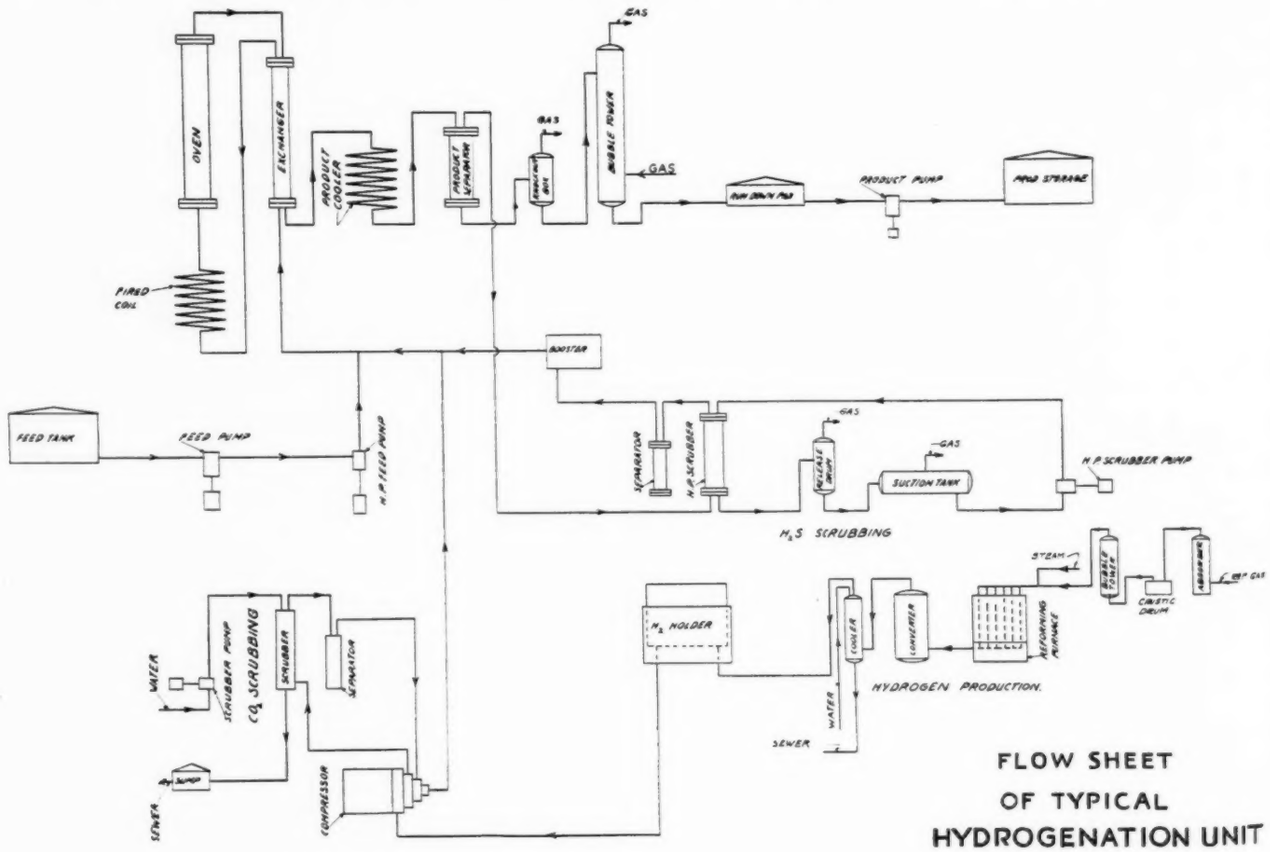
Hydrogen coming from the compressors is tested continuously in this special device which gives automatic warning of anything approaching a dangerous percentage of oxygen.

The oxygen content of the gas in the high pressure side of the plant is maintained at less than 0.2 percent by means of a special recorder-alarm, which is attached to the compressor discharge line. A small but representative sample of the gas is continuously removed from the line and passed through this device.

In this instrument the gas is washed and dried and passed through electrically heated porcelain tubes containing a platinum-black catalyst. The tubes are heated to a temperature of about 300 deg. Fahr., at which temperature and in the presence of this catalyst any oxygen present combines with the hydrogen to form water in a reaction which is highly exothermic. An accurate thermocouple pyrometer records the temperature in the furnace and any increase in temperature due to the formation of water is immediately recorded on a scale graduated in percent of oxygen. The electrical energy generated in the thermocouple by the heat of reaction actuates an electric alarm, which sounds in the control house. Whenever the oxygen content of the gas rises above the 0.2 percent maximum, the high pressure equipment is immediately shut down and the cause of the trouble investigated.

The unusual operating conditions embodied in this process have required the

(Continued on page 408)



FLOW SHEET OF TYPICAL HYDROGENATION UNIT

World Consumption Balances Production in 1931

World Consumption of Petroleum Products in 1931 Amounted to 1,373,000,000 Bbl. Petroleum Consumption Figures Prepared by Valentine R. Garfias and Raymond V. Whetsel, Foreign Oil Department, Henry L. Doherty and Company.

THE world's consumption of petroleum and its products in 1931 is estimated at 1,373,000,000 bbl., or approximately equivalent to the production of crude oil in that year. Of this total, gasoline made up 40 percent, kerosene 9 percent, gas and fuel oils 43 percent, lubricating oils 3 percent and miscellaneous products about 5 percent.

Gasoline and gas and fuel oils represented about 83 percent of the consumption, and were approximately equal in volume. Since the price of gasoline at the refineries is approximately four times that of gas and fuel oils, the controlling effect of the gasoline demand on the industry is at once apparent. The total value at the refineries of the gasoline is over one and one-half that of all other products.

The total consumption per capita was close to 29 gal. distributed approximately as follows: — gasoline 11⅗ gal., kerosene 2⅖ gal., gas and fuel oils 12½ gal., lubricating oils ⅘ gal. and miscellaneous products 1½ gal.

An idea of the magnitude of the petroleum industry can be gained by the

World's Consumption of Petroleum and Petroleum Products—1931

(Countries consuming over 1,000,000 bbl.)

	Crude Production (Thousands of Barrels)	CONSUMPTION Overall (Thousands of Barrels)	Percent Gasoline	Percent Kerosene	Percent Gas and Fuel Oil	Percent Lubes	Percent Miscellaneous	Population (in Thousands)	Consumption per Capita in Gallons Overall	Consumption per Capita in Gallons Gasoline
1. U. S. A.	851,081	900,250	45	5	42	3	5	122,775	307.86	138.58
2. Russia	162,598	90,000	6	22	63	3	6	161,006	23.52	1.41
3. United Kingdom	....	62,500	43	13	38	4	2	44,790	58.80	25.20
4. Canada	1,583	32,900	48	4	40	3	5	9,933	139.02	66.76
5. France	499	32,200	59	6	20	6	9	40,746	33.18	19.58
6. Germany	1,210	24,700	55	5	20	8	12	62,349	16.80	9.15
7. Argentina	11,709	20,700	26	8	63	2	1	10,904	79.80	20.73
8. British India	8,160	14,800	15	47	30	5	3	351,451	1.68	.27
9. Mexico	33,039	12,000	13	4	44	1	38	16,404	30.66	3.99
10. Italy	120	11,600	30	11	51	5	3	42,119	11.76	3.47
11. Australia	....	11,500	53	10	29	4	4	6,489	74.34	39.45
12. Japan	1,884	9,900	28	10	48	12	2	64,450	6.30	1.81
13. Roumania	47,843	9,500	7	12	72	2	7	17,393	23.10	1.61
14. Dutch West Indies	....	7,700	2	1	73	1	23	68	4,756.08	95.11
15. Holland	....	7,500	40	20	26	5	9	7,416	42.42	16.99
16. China	....	6,500	11	61	22	4	2	400,800	.67	.07
17. Spain	....	6,300	50	3	32	4	11	22,761	11.76	5.81
18. Dutch East Indies	35,391	5,300	8	26	50	2	14	61,000	3.78	.29
19. Belgium	....	5,000	40	12	28	13	7	8,060	26.04	10.42
20. Sweden	....	5,000	56	13	24	6	1	6,142	34.02	19.13
21. Chile	....	4,700	18	1	78	1	2	4,273	46.20	8.32
22. Cuba	18	4,600	15	8	70	2	5	3,608	53.34	8.03
23. Denmark	....	4,600	46	14	29	5	6	3,551	54.60	25.03
24. Venezuela	115,764	4,300	24	1	73	1	1	3,216	56.28	13.48
25. Brazil	....	4,100	37	16	39	6	2	40,273	4.20	1.58
26. Egypt	1,712	3,900	12	59	23	2	4	14,169	11.76	1.39
27. British Malay	....	3,600	15	7	74	1	3	3,120	48.30	7.27
28. Philippine Islands	....	3,400	25	16	55	2	2	12,604	11.34	2.84
29. New Zealand	....	3,200	56	7	25	3	9	1,511	89.04	49.81
30. Panama	....	3,100	3	2	93	1	1	467	278.88	8.36
31. Czechoslovakia	200	3,100	50	25	8	10	7	726	179.34	89.67
32. Persia	43,041	3,000	5	13	58	1	23	10,000	12.60	.63
33. Poland	4,662	3,000	23	37	16	11	13	30,213	4.20	.96
34. Hawaii	....	3,000	26	3	68	1	2	368	342.30	89.02
35. Peru	10,660	2,800	14	10	71	3	2	6,147	19.32	2.68
36. Union of South Africa	....	2,700	64	11	14	4	7	6,929	16.38	10.47
37. Switzerland	....	2,600	60	7	26	6	1	4,019	27.30	16.30
38. Norway	....	2,300	35	12	46	3	4	2,890	33.60	11.70
39. Austria	....	2,300	45	15	32	7	1	6,675	14.28	6.51
40. Ireland	....	1,800	65	32	1	1	1	2,973	25.62	16.53
41. Uruguay	....	1,500	50	20	26	3	1	2,037	26.04	13.02
42. Greece	....	1,400	34	13	48	4	1	6,204	9.66	3.22
43. Hungary	....	1,300	35	24	18	3	10	8,684	6.30	2.20
44. Colombia	18,235	1,200	25	6	64	2	3	7,993	6.30	1.58
45. Iraq	1,200	1,200	5	14	72	8	1	3,000	16.80	.84
46. Morocco	....	1,100	62	19	6	5	8	4,973	9.24	5.76
47. Trinidad	9,769	1,000	15	2	74	5	4	397	105.42	15.87
48. Portugal	....	1,000	40	32	23	1	4	5,629	7.56	3.02
49. Porto Rico	....	1,000	18	10	67	1	4	1,344	27.30	4.90
Miscellaneous	10,729	20,389	25	24	47	2	2	344,749	2.48	.62
Totals	1,371,107	1,373,039	40	9	43	3	5	2,000,000	28.83	11.52

accompanying estimate of the value of the products consumed during the year.

Value of Petroleum Products Consumed in 1931

	Barrels	Price per bbl. dollars	Total value dollars
Gasoline	548,490,000	1.47	806,280,000
Gas and Fuel Oils	588,576,000	.36	211,887,000
Lubricating Oils	45,954,000	2.61	119,940,000
Kerosene	115,614,000	.87	100,584,000
Miscellaneous	74,405,000	1.00	74,405,000
			$1,313,096,000

These figures are based on the approximate prices at American refineries and may be considered as a conservative estimate of wholesale prices. The retail prices would probably give two to four times higher totals. The prices of lubricating oils probably show the greatest spread between wholesale and retail figures.

The available information on the utilization of petroleum products has been compiled in the accompanying tables listing the countries in the order of their consumption in 1931. Table 1 includes those countries in which the consumption was 1,000,000 bbl. or more and Table 2 those in which it was less than 1,000,000 bbl. In order that the total consumption be shown on one table, the totals of Table 2 are included in Table 1 under the heading of "Miscellaneous."

The data presented, although of necessity only approximately accurate, conveys in the aggregate a true general picture of the world's consumption of petroleum products in 1931.

A study of the tables discloses some interesting and at times rather startling conditions. It will be seen, for instance, that the United States is by far the most important consuming country utilizing 900,000,000 bbl. or about 65 percent of the world's demand. Russia, second rank, consumes only 1/10 as much as the United States and the difference between these countries is more apparent when one realizes that the consumption of gasoline per capita in the United States was 138 gal. and in Russia only 1 1/10 gal. These figures, on the other hand, indicate the possibility of an increase in the Russian consumption when the internal conditions become normal, and that such an increase in demand will be a very important factor in the stabilization of the industry throughout the world. At present, with a population of 161,000,000, Russia consumes less gasoline than Australia with only about 6,500,000 inhabitants. The United Kingdom is the third largest consumer with a total of 62,500,000 bbl. and a per capita demand about 1/5 that of the United States. The total consumption of Canada and France is about equal, but Canada consumes four times as much of all petroleum products, and over three times as much gasoline per capita as France. Germany's total consumption ranks sixth, but its consumption per capita is even lower than Russia's. This also indicates the possibility of an increase in the consumption of Germany under improved economic conditions. The large per capita consumption of Argentina is worth noting. The abnormally high per capita consumption of Dutch West Indies is due to the small population and the large usage of fuel oil in the refineries at Aruba and Curaçao. The naval bases at Hawaii and Panamá and the small population of these countries likewise account for their abnormally high per capita consumption.

The restricted use of automobiles, likely indicating also the scarcity of good roads, is reflected by the small per capita consumption of gasoline and by the low percentage that the gasoline consumption bears to the total for all products in countries such as Russia, Roumania, Dutch East Indies, Persia and China, while the restricted use of electric lighting is reflected in the high consumption of kerosene in India, China and Egypt.

World's Consumption of Petroleum and Petroleum Products—1931

(Countries consuming less than 1,000,000 bbl.)

	Crude Production (Thousands of Barrels)	CONSUMPTION Over All (Thousands of Barrels)	Percent Gasoline	Percent Kerosene	Percent Gas and Fuel Oil	Percent Lubes	Percent Miscellaneous	Population (in Thousands)	Consumption per Capita in Gallons Over All	Consumption per Capita in Gallons Gasoline
50. Jamaica	....	960	16	5	78	1	..	858	47.04	7.54
51. Hong Kong	....	900	7	6	84	1	2	1,076	35.28	2.46
52. Finland	....	900	54	27	10	6	3	3,582	10.50	5.70
53. Yugo-Slavia	....	900	33	44	11	9	3	13,290	2.94	.94
54. Turkey	....	700	30	37	22	5	6	13,641	2.10	.65
55. Tunisia	....	700	46	31	14	5	4	2,160	13.44	6.26
56. Siam	....	700	34	34	27	4	1	11,506	2.52	.87
57. Syria-Palestine	....	700	43	41	11	3	2	3,648	7.98	3.47
58. Bulgaria	....	600	13	39	36	9	3	5,597	4.62	.59
59. Algiers	....	600	60	22	12	4	2	6,065	4.20	2.49
60. Ecuador	1,762	400	22	8	68	1	1	1,500	11.34	2.46
61. Lithuania	....	300	18	47	25	7	3	2,340	5.46	.97
62. Latvia	....	300	33	56	6	5	..	1,900	6.72	2.19
63. Indo China	....	300	39	41	14	2	4	19,844	.84	.33
64. Tripoli	....	300	56	23	17	2	2	589	21.42	11.98
65. Ceylon	....	300	4	25	69	1	1	5,442	2.52	.09
66. Dominican Republic	....	300	17	12	68	1	2	1,200	10.50	1.79
67. Alaska	....	300	11	18	69	1	1	59	213.36	23.49
68. Korea	....	270	26	63	7	..	..	21,058	.42	.11
69. Gold Coast	....	250	58	29	8	5	..	2,300	4.62	2.65
70. Canary Islands	....	250	46	14	37	1	2	482	21.84	10.02
71. Sarawak	3,669	230	3	10	66	1	20	600	15.96	.49
72. Caribbean Islands	....	200	18	10	68	1	3	1,000	8.40	1.51
73. Spanish North Africa	....	200	57	17	22	1	3	236	35.70	20.29
74. Estonia	....	200	20	45	27	5	3	1,111	7.56	1.51
75. Guatemala	....	200	77	22	..	..	1	2,119	3.78	3.05
76. Guianas	....	200	55	24	18	1	2	505	16.80	9.15
77. Bolivia	25	190	21	5	64	4	6	2,952	2.52	.57
78. Honduras	....	190	72	20	5	1	2	773	10.50	7.44
79. Haiti	....	180	19	14	62	2	3	2,300	3.36	.62
80. Nicaragua	....	150	69	26	4	..	1	750	8.40	5.82
81. Gibraltar	....	150	58	21	16	1	4	18	349.86	203.00
82. Costa Rica	....	100	63	32	4	..	1	472	8.82	5.06
83. Madagascar	....	100	51	28	9	9	3	3,621	1.26	.59
84. Salvador	....	70	59	38	2	..	1	1,438	2.10	1.20
85. Arabia	....	40	60	14	23	1	2	7,000	.25	.15
86. Bahamas	....	39	45	20	34	1	..	60	27.30	12.60
87. Tangiers	....	20	60	20	14	5	1	52	15.96	9.69
88. Miscellaneous	5,273	7,000	8	19	73	..	..	201,605	1.46	.11
Totals	10,729	20,389	25	24	47	2	2	344,749	2.48	.62

British Petroleum Consumption Decreasing

Considerable Decrease in Consumption of Motor Fuel and All Other Products Except Kerosene Revealed by Board of Trade Figures. Changing Character of Imports.

BRITISH consumption of motor spirit, and of petroleum products generally, was less in 1931 than in the previous year, but the decline was certainly no larger than might have been expected. This deduction may be drawn from figures published a few weeks ago in the BOARD OF TRADE JOURNAL.

British Imports of Crude 1928–1931

(Thousands of barrels of 42 U. S. gallons)

Sources of Supply	1928	1929	1930	1931
Persia	11,717	9,714	9,650	7,000
Venezuela	1,183	1,848	2,446	2,671
Colombia	820	1,357	150	...
Trinidad	157	597	700	200
Mexico	352	394	...	...
Roumania	28	20	...	...
United States	17	...	163	...
Other countries	43	...	3	...
Total	14,317	13,930	13,112	9,871

Customs and Trade Returns

A feature of these statistics is the rapid decline in total imports of petroleum in its crude state, and the complete cessation of such shipments from most major producing countries.

From the figures which follow it is evident that while crude imports have declined, a larger amount of refined and semi-refined products consisting of kerosene and heavy oil residues must have been imported for treatment of one kind or another in British refineries.

British Refinery Throughput 1928–1931

(Thousands of barrels of 42 U. S. gallons)

	1928	1929	1930	1931
Petroleum	18,550	18,997	18,650	18,600
Shale oil	1,232	1,210	1,194	1,043
Total	19,782	20,207	19,844	19,643

Customs and Trade Returns

While, as shown in the first table, imports of crude fell by nearly 25 percent last year as compared with 1930, refinery throughput has shown much less variation, although the tendency has been slightly downward in recent years.

The output of refineries is summarized below, these figures, like those relating to throughput, being based on returns of the companies concerned.

Reduction in the percentage of liquid products obtained to the whole output is attributable to the treatment of increasing quantities of heavy fuel oils at refineries for production of asphalt and pitch.

Imports of oil products other than for refining are given as 45,743,000 bbl. If this figure is deducted from the 53,266,000 bbl. already published in the Trade Returns as all products imported during the year, the figure of 7,523,000 bbl. is reached as the total of products imported for further refining.

Crude imports for 1931 were therefore 9,871,000 bbl. while products other than crude, imported for refining amounted to 7,523,000 bbl. giving a total of 17,394,000 bbl. total petroleum products imported for refining.

Since throughput of petroleum, as

Output of British Refineries 1928–1931

(Thousands of barrels of 42 U. S. gallons)

Product	1928	1929	1930	1931
Motor Spirit	4,537	4,791	5,156	5,329
Other Spirit	1,020	726	603	597
Kerosene	2,403	1,909	1,511	1,526
Gas oil	846	880	820	1,014
Lube oil	443	620	694	540
Fuel and Diesel oil	7,894	7,746	7,746	6,129
Other liquid products	32	143	309	363
Total liquid products	17,175	16,815	16,839	15,498
Percent of liquid products to throughput	86.7	83.4	84.4	79.0

Customs and Trade Returns

opposed to shale, was 18,600,000, some 1,206,000 bbl. appear to have been drawn from stocks during the year. Calculation on the same lines arrives at an addition of 926,000 bbl. to stocks in 1930.

From the figures set out in the tables above, and other detailed statistics produced by the BOARD OF TRADE JOURNAL, it is possible to build up the following comparison of total consumption of petroleum products in Britain. These tables, of course, assume that stocks have remained constant.

On the basis of a withdrawal of 1,206,000 bbl. from stocks, already arrived at, the above figures suggest a substantial reduction in British consumption of petroleum products.

Similar calculations for motor fuel alone show that consumption in great Britain increased from 24,263,000 bbl. in 1929 to 29,660,000 bbl. in 1930 and then fell away to 28,700,000 bbl. in 1931.

In view of current trade depression and increased taxation combined with statistics relating to the manufacture and use of automobiles in Britain, the fall in the demand for gasoline may be taken at its face value.

British Consumption of Petroleum Products

(Thousands of barrels of 42 U. S. gallons)

	1929	1930	1931
Refinery output	16,815	16,839	15,498
Less exports	3,157	2,963	1,903
Retained production	13,658	13,876	13,595
Imports (other than for refining)	42,950	49,106	45,743
Re-exports	2,920	2,057	2,060
Retained imports	40,030	47,049	43,683
Consumption (retained production plus retained imports)	53,688	60,925	57,278

Customs and Trade Returns

Among other petroleum products, the figures show that only in the case of kerosene was consumption above that for 1930. This increase is largely accounted for by the tendency to expand the use of oil heaters and cookers for domestic purposes.

Although no statistics for the current year have been issued, unofficial estimates of consumption from an authoritative quarter confirm the general impression that the falling off in British demand for oil products will become appreciably steeper during the current year.

▼

Yugoslavia Motor Fuel Shortage

OWING to the imposition of very high import duties, the three major oil companies operating in Yugoslavia have been finding it almost impossible to continue importing gasoline into this country. Many buslines have suspended service, and taxicabs are gradually disappearing from the streets. Conferences recently held by the Minister of Commerce with the oil interests have resulted in an understanding being reached.

Spanish Bankers and the Petroleum Monopoly

A Second and More Severely Critical Review of the Progress of Spain's Oil Monopoly Ascribes Its Shortcomings to the Interested Motives Which Led to Its Origin.

THE following article has been received from a correspondent in Spain. It conflicts on various points with an article published in the June issue of World Petroleum; but in view of the wide interest in the subject we are publishing the statement without amendment. Our correspondent is in a position to be well posted on the structure and operation of the monopoly. Editor.

CONTRARY to what appears to be generally believed the Spanish monopoly in petroleum products has been a bankers' enterprise from the beginning. It was and still is operated for the advantage of a group of Spanish banks which have used the law for private gain and as a means of furthering their own ends in various ways. There is good ground, however, for the belief that the days of the monopoly are numbered, and that we shall shortly see a resumption of the free market in petroleum products.

Up to the latter part of 1927, the petroleum industry in Spain was in the hands of British, French, American and Spanish companies. In all some 20 concerns had been active in the trade for nearly 30 years, and the marketing of petroleum products had been developed along free commercial lines. As a result there had been rapid development of motor transport, and the use of petroleum products for general industrial purposes had made great advances.

In October, 1927, a royal decree was issued which established a monopoly and placed administration in the hands of a consortium of Spanish banks. The decree promised many things. There was to be reduction in the general expenses of management and distribution of the products in question, prices were to be lowered and the people were assured that the monopoly would be to their very great benefit. An ambitious plan was outlined which provided for the purchase of producing wells and oil fields, construction of refineries and tank steamers, with distribution in the hands of Spanish subjects.

As soon as the monopoly began business, however, certain things happened that cast a shadow of doubt on the promises. It was found that the best positions in the monopoly were given to friends of those in power, to political factors, retired army men and so on, none of whom had had any experience in the oil business. Relatives and friends of government officials were given agencies of the monopoly, on a commission basis, in the 49 Spanish provinces. Their commissions amounted to 8,000,000 pesetas in 1928. These positions were sinecures in the full meaning of the word. The agents assumed no risk as payment for petroleum products, under the Spanish monopoly, must be made in cash and in advance.

This policy has been characteristic of the monopoly in all of its activities. There is no indication that the advantage of the public has been considered, and there is evidence that it has operated to the enrichment of a few. Thus, in 1930, the monopoly announced a most ambitious program which included the construction of a refinery at Barcelona, the purchase of tank steamers, formation of a company to be given the monopoly of transporting and distributing petroleum products to Spain, and so on. The banking group in control planned to form a company to operate the refinery in Barcelona, another company which would have charge of leasing all fuel-pumps in Spain and still another company for motor truck transport. For each of these enterprises the bankers planned to issue large amounts of stock to be sold to the public. However, so intense did opposition become on the part of the press and people that this plan was abandoned.

During 1930 the construction of several tankers was begun in Spanish yards. Contracts were awarded to friends of those controlling the monopoly, and the prices for the tankers were some 60 percent in excess of those which could have been obtained under normal competitive conditions. In this year the bankers also made the tidy sum of 10,000,000 pesetas from interest charged on loans to the monopoly, for so little working capital had been provided for the enterprise that it had to live on bank loans.

Judged from a business standpoint, the monopoly has developed excessive operating and overhead expenses, in 1929–1931 the general expense being more than 100,000,000 pesetas on a total turnover of 450,000,000 pesetas. The monopoly is exempt from all direct and indirect taxation, and the national treasury has lost more than 20,000,000 pesetas annually, the average sum received formerly from private companies. From the time the monopoly was established the public has received products of inferior grade at higher prices than those ruling elsewhere, while motor transport has lost much of the advance it had gained in the days of free competition.

The price situation is particularly striking. While prices of petroleum products have decreased throughout the world, those in Spain have steadily increased. In 1932 it is estimated that consumers will pay from 50,000,000 to 60,000,000 pesetas more than in 1931, and increase in prices alone, since the monopoly was established, has placed a burden on the consumer of more than 100,000,000 pesetas. It is true that there has been depreciation of the peseta during the past two years, but the advance in prices has been much more rapid.

All of these facts are known throughout Spain, and they are detailed here not because they are new, but merely to present an undisputed situation.

From the first the monopoly had great difficulty in obtaining supplies, and although the original decree provided for the establishment of a completely integrated petroleum industry, with its own wells and oil fields, refineries, tankers and so on, this part of the plan was never carried out. It is true that in June 1929, a commission, representing the monopoly, went to South America for the purpose, it was stated, of acquiring oil wells, but it was found that this was not possible because of certain legal difficulties.

In consequence the monopoly has had to purchase its supplies from producers in different countries, being in fact merely a distributing organization, operated by

(Continued on page 407)

Germany—Oil Resources and Oil Market

How Near is Germany to Self-Sufficiency in Petroleum?—America's Declining Share in German Market.

By M. David Gould

GERMANY, formerly America's third largest customer in gasoline imports and among the largest buyers of lubricating oil, has been steadily reducing its purchases of American oil products. In part this results from the general economic crisis, in part from the displacement of American products by Russian and to a smaller extent Persian gasoline, and to some extent from increasing utilization of domestic oil resources.

As a result, America's participation in Germany's imports of gasoline, which was about half of the total from 1927 to 1929, declined last year to 43 percent and for the first four months of this year amounted to about 28 percent of the total. Russia during the same period of 1932 supplied 35 percent of Germany's import requirements. Total German imports for the first four months of 1932 were only 44.1 percent of the corresponding period of last year.

The question of increasing her independence of foreign oil resources is a vital one in Germany. Autarchy (economic self-sufficiency) is part of the program of the right-wing extremists in politics. On the technical side, discovery of a second producing oil field; increasing interest in hydrogenation and the use of tar oils as the basis for synthetic gasoline; and the large use of domestic alcohol and benzol for adulterating motor fuel, provide an economic foundation for increasing independence in the oil business, with its corollary of decreasing imports.

Germany imports relatively little crude oil; slightly over 10 percent of its annual petroleum requirements of some 16,800,000 bbl. Its refining capacity as of Sept. 1, 1931, was calculated at some 33,000 bbl. a day, a large part of which, however, consisted of asphalt and lubricating oil plants. Since then, a 2,000-bbl. plant has been erected at Misburg, and went into operation at the end of April. Other than a small addition to the Wintershall Potash Company's lubricating oil plant in Salzburg, no important new construction is under way.

All oil products, including crude, are imported under a heavy duty, ranging from 10 to 17 marks per 100 kilos, or in the case of crude nearly $4 a barrel. In the case of gasoline, import duties plus certain other State charges amount to 19 pfennigs a liter against a c.i.f. quotation delivered at Hamburg of 5 pfennigs; i.e., the duty is nearly four times the tanker price.

These circumstances furnish a powerful stimulant to domestic production. On the other hand, even with the recent addition refining capacity is barely able to take care of existing crude oil supplies. Refiners, however, do not care to increase capacity until additional supplies over a long period of time are assured, for fear of adverse action either by their own government or by other countries. The Misburg plant, equipped with Dubbs cracking units, was built for the specific purpose of handling the growing output of the Nienhagen field.

Production Outlook

SUBSTANTIAL increase in domestic production is not expected within the very near future, barring another accident such as that which led to the discovery of the Thuringian field. The determining factor is apparently the shortage of capital necessary for drilling additional wells in proven areas, as well as the relatively limited wild-catting activities.

Germany's production last year was the highest in its history, 1,778,602 bbl., against 1,209,185 bbl. in 1930 and a previous peak of 1,032,000 bbl. in 1910, which included production from Alsace-Lorraine. Of last year's output, 1,239,000 bbl. came from the old Hanover fields, which have been worked in part since 1873. The remainder came from the Thuringian field.

Output for 1932 will not be far from the same total figure; Hanover is expected to produce a little more and Thuringia, because of a fire in the first two months of the year and delays incidental to installing air-lift, will have a somewhat smaller production.

At the present rate of production Germany should be able to supply some 12 percent (2,100,000 bbl.) of her present market within a relatively short time.

Present Production Analyzed

PRESENT production comes from the following fields, the first four of which are in Hanover:

1. Wietze field, oldest and until recently second largest, which reached its peak in 1908. After the war, the Deutsche Petroleum A. G., the controlling interest, which had operated in the Pechelbronn field in Alsace, applied to Wietze the distinctive Pechelbronn method of mining out oil sands and extracting oil by washing with hot water. About half the present production of some 15,000 bbl. monthly is obtained by this method; the remainder from wells and seepages. Six to eight rigs are in operation. Field produces both light oil (0.880 sp. gr.) and heavier oil (0.940 sp. gr.). Its output goes in large part to Deutsche Petroleum's own refineries.
2. Hänigsen-Nienhagen field, largest producer of the Hanover area, is controlled by the Elwerath Company and the Anton Raky A. G., with a substantial indirect participation by the Wintershall Potash Company. Production has increased sharply since 1921, but has apparently not yet reached its peak. Six wells are in production at the present time, and some seven or eight rigs are in operation. The product, a medium heavy oil, of 0.910 to 0.930 sp. gr., goes to the new Misburg refinery.
3. In the Oelheim-Eddesse field the leading factors are Anton Raky A. G. and the Preussag, a corporation whose sole stockholder is the State of Prussia. Its product, a light oil of 0.850 to 0.880 sp. gr., likewise goes in part to Misburg. There is little drilling activity here, only two rigs being in operation.
4. In the Oberg field, likewise producing a light oil, the main interest is the Ebag (Erdöl Bergbau A. G.). Some four rigs are in operation.

Elsewhere in the Hanover area some eight to ten rigs are testing locations.

Thuringia

5. THE entire production of Thuringia comes from the Volkenroda field, where a gas explosion revealed the existence of oil to the Burbach Potash Company which had been mining potash in this area for 20 years. Drilling was started from the bottom of the 3,000-ft. shaft of the potash mine, a second shaft being used to continue mining from higher levels.

   The oil, a light product of 0.850–0.880. sp. gr., goes to the Leuna plant of the I. G. Farben for hydrogenation.

   There is considerable drilling activity in this area. Near the discovery well at Volkenroda there are some six to eight rigs in operation, all being started from below the surface in the mine workings. At Mühlhausen near Vossberg in Thuringia a rotary

rig is testing an anticlinel structure and is down nearly 3500 ft.; it is the first hole drilled from above the ground.

In addition to Burbach, which controls a substantial area in this field including all the production to date, a combination of Wintershall (potash), Elwerath (oil producers) and Preussag (Prussian State) controls a large acreage. Wintershall also owns in its own name the largest single tract of potential oil land in the area, and the Preussag controls a further large area through lease negotiations. In view of the necessity for separate dealings for each parcel under separate terms and the absence of a standard form of lease as in the United States, such negotiations are protracted and are still going on.

Unproven Territory

FOREIGN firms are active in wild-catting operations in other parts of Germany. The North European Oil Company, which had accumulated 1,500,000 acres of wild-cat holdings in Hanover, Bremen and Oldenburg, sold about half of them for $900,000 to the Shell Company, which has two rigs working, one for shallow depths to about 1,000 ft., the other capable of going to some 6,000 ft., and is using them alternately. Its interests are concentrated in the Eastern Rhineland and in Westphalia. Meanwhile North European Oil is doing geophysical exploration work in East Friesland and Württemberg but not drilling.

Cities Service has drilled three holes near Sehnde, in Hanover, obtaining a show of oil but no commercial output.

In Brunswick the Elm Erdöl, a subsidiary of the British Borneo Petroleum Syndicate Ltd., is drilling, and is believed to be down to some 4,500 ft. Preussag is drilling at Hackelwald near Aschersleben, in Prussian Saxony.

Other German Domestic Resources

CURRENT estimates of the entire German market for motor fuel and oil products are around 16,800,000 bbl. Of this about 4,760,000 bbl. are obtained from domestic sources. Crude oil accounts for some 1,610,000 bbl. of the total; 840,000 bbl. are alcohol used for motor fuel, 1,820,000 bbl. are benzol used for motor fuel, and some 420,000 bbl. are synthetic gasoline.

The market for gasoline is something over 10,000,000 bbl. annually, and for lubricating oil something under 2,000,000 bbl.

Taking up the other German domestic resources, the supply of alcohol, which is a Government monopoly handled by the Deurag, whose stock is held by the German Reich, has been increased by the decrease in the use of spirits for beverage in Germany since the war. In 1913, estimated average consumption of spirit per capita was two liters per annum; at present it is about half a liter.

In order to help out the agricultural interests, the Government has ordered all gasoline distributors to buy 6 liters of alcohol for every 100 liters of gasoline sold, with the right to take a cash loss if they do not wish to buy the alcohol. A mixture of gasoline and some 20 to 25 percent of alcohol called "Monopolin" is distributed by the RKS (Reichskraftsprit or Government Motor Fuel Alcohol) in which the Government has a 49 percent interest, while 51 percent is owned by the major distributors of gasoline in Germany, outside of the Derop, the Russian agency. Most gasoline marketers handle two brands, one consisting of straight gasoline or gasoline and alcohol, and a second containing up to 35 or 40 percent of benzol, commanding a somewhat higher price.

Standard Oil of New Jersey, for instance, through its subsidiary, the Deutsch-Amerikanische Petroleum A. G., sells in Berlin "Dapolin" at 31 pfennigs a liter, and "Duolin" containing benzol at 35 pfennigs roughly equivalent to 30 and 33.3 cents a gallon, respectively. About 60 percent of the motor fuel sold in Germany is straight unmixed gasoline.

The German Government has recently raised the alcohol purchase requirement from 6 to 12 percent. Under present conditions this is equivalent to an additional charge of some 1.2 to 2 pfennigs a liter.

Benzol production varies largely with changes in steel production, the chief source of supply being by-products of coke ovens. A domestic production of some 200,000 tons, supplemented by some 100,000 tons of imports, might be stretched under favorable circumstances by an additional 50,000 tons, indicating a supply ranging from the current equivalent of 1,820,000 bbl. of motor fuel to a possible 2,450,000 bbl.

The use of benzol was greatly extended during the war, when imports were difficult. German motor design has consistently emphasized relatively high compression ratios, requiring fuel of high octane number. The current trend, however, is toward wider use of alcohol and rather less of benzol, although both have decided anti-knock value.

Synthetic gasoline, currently estimated to yield some 420,000 bbl. can be extended, so far as engineering and technology go, to a much higher figure. Cost of processing is so high, however, that it requires the present enormous duties to provide sufficient protection to enable the process to develop. Unless synthetic production costs are brought down or further increase in gasoline prices is established, expansion in this direction is not considered a probability for the near future.

Neither Germany's immediately available crude oil resources, nor its present position in regard to non-hydrocarbon sources of motor fuel, render autarchy with regard to gasoline and oil products probable during the next few years. The gradual tendency in this direction is unmistakable, however, and is an important part of the long-term outlook for this market.

Analysis of the German Market

A MORE important immediate factor is the increasing activity of Russian and Persian gasoline in the German market. In the first four months of this year, out of 1,730,000 bbl. imported, Russia supplied 584,000 bbl. The United States 492,000 bbl., and Persia 256,000 bbl.

In the marketing field, the relation is somewhat different. Standard Oil of New Jersey sells about 22 percent, Shell about 20 percent, Russia about 10 percent, and Anglo-Persian Oil about 10 percent of the retail market; the alcohol monopoly (RKS) and a number of smaller companies operating on a regional scale dividing up the rest.

The marketing end of the business is considered unprofitable under present conditions. Retail prices vary in different localities according to size of local market, competitive conditions, transportation costs, etc.; but generally range from 31 to 35 pfennigs a liter, or 30 to 33.3 cents a gallon.

Taking 33 pfennigs as a fair average, this compares as follows with the costs as stated to the writer by a leading oil executive:

Marketing Cost of Motor Fuel in Germany

	Pfennigs
Import duty plus net alcohol cost	19
Cost of gasoline cif tanker Hamburg	5
Freight to German interior points	2
Transportation, bulk warehouse to pump	1½
Total cost	27½
Gross spread on business done at full retail price	5½

On the other hand, fully 60 percent of the gasoline sales of the big companies are done at a discount of one kind or another —large industrial customers, the Reich government, State and local governments, transportation companies (the Post Office Department, for instance, runs an excursion bus service), etc. In addition the retailer's spread between tank wagon and filling station price ranges from 7 to 10 pfg.

All in all, these discounts average about 3½ pfg. a liter. This leaves a margin for doing business of 2 pfg. a liter, against which retail marketing costs are estimated, with present gallonage, at 6 to 7 pfg.

Last year a majority of the companies operating in Germany formed a Benzin Konvention or gasoline price agreement to meet this situation. It did not attempt to set quotas, like the usual German cartel agreement, but only to regulate prices. It practically broke up, however, in the fall of 1931 after a number of medium and small-sized firms withdrew, and after the

Russian agency quit to engage in a vigorous drive on the market using price as a weapon. For the time being the Konvention is still in existence, with the major non-Russian companies as members.

The high taxes and duties explain the paradox of high prices for gasoline in Germany, some 2½ to 3 times American retail prices, accompanied by poor business and falling volume. A contributing factor to the low demand is the high taxation of automobiles, which falls heaviest on larger cars and has resulted in an inordinate development of the small car with low gasoline consumption. The average tax per car is reckoned at 796 marks or $180 a year, against an estimated average of $133 in England, $81 in France, about $100 in most European countries, and something over $30 in the United States. In view of the present and prospective financial position of Germany, it is unlikely that this convenient but stifling form of taxation will be lightened soon.

German Imports, January–April, 1932 and 1931

	Jan.–April 1932 Barrels	Jan.–April 1931 Barrels	Percentage Loss
Gasoline	1,743,980	3,117,282	44.1
Kerosene	275,219	390,467	29.5
Gas Oil	700,329	952,063	26.4
Lubricating Oil	784,042	902,356	13.1

German Crude Production, 1920–1931

	Barrels
1920	243,145
1921	268,723
1922	293,965
1923	353,850
1924	415,364
1925	553,910
1926	667,583
1927	678,181
1928	644,021
1929	726,586
1930	1,187,144
1931*	1,596,000

* Thuringian production estimated.

▼

Polish Domestic Sales Agreement

IN JUNE of this year a syndicate of crude oil producers in Poland was formed and since that time, encouraged by the Polish Government, every effort has been made to reach an agreement with the Refiners Syndicate, of which the Government is a member, for the sale of the entire production of the producer's organization. Such an agreement has recently been reached and has been in operation during August. The producers syndicate controls about 80 percent of the production of Poland and by means of their price agreement with the refiners hopes to be able to force the remaining independent producers to accept the terms arranged with the refiners. The agreement, which has the full sanction of the Polish Government, establishes a standard price of $1.80 per kg. for Boryslaw crude with prices for other crudes reckoned from this standard. This price is to continue in force for the first two months of the agreement (August and September) after which the standard price will be reduced to $1.70.

Success of this agreement will bring order out of the chaos which has existed in the Polish petroleum industry in the past and is viewed with satisfaction by those connected with the industry in that country. Some difficulty, however, may be anticipated in raising the cash for the first two payments for crude as the refiners syndicate has agreed to purchase a set amount per month in spite of the considerable supply they have on hand at present.

▼

"Kinship with Kidd" Brings $54,000,000 Libel Suit

TWO additional suits filed by H. L. Doherty seeking $42,000,000 damages from the KANSAS CITY STAR bring the total damages for alleged libel up to $54,000,000 in suits pending in the Topeka, Kansas, district court. The suits, two of which were filed recently and the third a year ago, allege that the defendants were attempting to injure the plaintiff in his business, to impair his security holdings in Cities Service Company and its subsidiaries, to arouse public indignation against him and to expose him to ridicule. The litigation grew out of the STAR'S campaign against the gas rates charged by Doherty-controlled companies in Kansas.

In reply to the two most recent suits the STAR ran an editorial accusing Doherty of attempting to divert interest from the question of gas rates and to make the controversy appear to be a STAR-Doherty fight.

Specifically the petitions mention among other things an article printed in the STAR, December 1930, charging that H. L. Doherty benefited personally from fees paid to Henry L. Doherty and Company by affiliated companies; and an editorial which stated that Henry L. Doherty and Company owned property on Wall Street once the site of Captain Kidd's home which he "may have taken over out of sentiment for a pioneer for whom he doubtless experiences a feeling of kinship. Kidd was executed for piracy, but that was more than 200 years ago."

At the same time the suits were filed, the KANSAS CITY JOURNAL-POST, a paper in which Doherty bought a half-interest last year as a medium through which to answer charges in the STAR, published his statement giving reasons for the suits and the huge sums involved. Briefly these were: to compensate his company for the injury done it by the STAR, to free the business interests of the Middle West from what are referred to as "terroristic tactics" of the STAR, and to provide an example through which the public and public institutions may be protected in future.

Mr. Doherty's suits are the largest libel action against a single American newspaper on record and mark the climax in a long struggle between Doherty interests and the KANSAS CITY STAR.

▼

Electrical Coring in Trinidad

A SYSTEM of electrical coring of oil wells has recently been introduced into Trinidad by Mr. P. Bayle, representative of the Schlumberger Company, and most of the major operators have favourably considered adopting its use, as it is claimed that the process (described as an electric "eye") will effect a saving of thousands of dollars and enable wells to be drilled with greater speed.

The electric "eye" has been devised by M. Conrad Schlumberger, a noted French Mining Engineer and Scientist.

▼

REFINERY engineers of the Phoenix Oil and Transport Company, Ltd., London and Bucharest, have recently been visiting the United States studying the latest refining methods, and modifications are now being made to the company's refining plant in Roumania to increase its efficiency.

Foreign Oil Legion

William J. Kemnitzer, co-author of Petroleum in the United States and Possessions, sailed for London, August 19, to investigate some aspects of the international petroleum situation.

▼

Engineers Kitano and Negoro, Nippon Oil Company are at present in California studying American drilling technique.

▼

Russell Palmer, publisher of World Petroleum, Petroleum World, Facts About Sugar and other industrial journals, sailed for an extended visit to European countries on the SS Statendam on August 12.

▼

C. C. Bampton, chief transport superintendent of the Anglo-Persian Oil Company, has been loaned to the Iraq Petroleum Company for temporary duty.

▼

E. H. O. Elkington, general manager in Persia of the Anglo-Persian Oil Company, has been enjoying a vacation in England.

E. W. Shaw, Chief Geologist, I. P. C.

William Wallace, vice-president of the Venezuela Gulf Oil Company, has returned to New York following a visit to his company's properties in Venezuela.

▼

Walter C. Teagle, president, Standard Oil Company (N. J.), has been appointed chairman of the committee on employment in the New York Federal Reserve District of the President's Economic Conference. Mr. Teagle has begun a nation-wide drive to induce employers to shorten hours thereby increasing the number of employees.

▼

A. S. Crutcher, recently returned from England and France, has been made sales manager of the pipeline division of W-K-M Inc.

▼

P. W. Lambright, Standard Oil Company of New Jersey, has been transferred from Argentina to Sumatra.

Iraq Petroleum Company officials in the field: Messrs. Meny, Jameson, Ball, (A. P. O. C.) Southwell, and Haynes.

C. G. Sheffield, vice-president of the Standard Oil Company of New Jersey, has also been made vice-president of Standard of Pennsylvania in charge of sales. Mr. Sheffield will retain his present position in the parent company.

▼

▲

C. G. Sheffield

▼

J. H. Senior, president of the West India Oil Company, and vice-president in charge of domestic marketing division of the Standard Oil Company of New Jersey, is now president of the Standard Oil Company of Pennsylvania.

▼

K. R. Kingsbury, president, Standard Oil Company of California, is in Washington attending the President's Economic Conference. Mr. Kingsbury is chairman of the industrial committee for the Pacific Coast Federal Reserve district.

LIBRARY

BOOKS relating to the petroleum industry may be obtained from the Book Department of WORLD PETROLEUM at the publishers' prices plus postage.

▼

MAPS OF IRAQ WITH NOTES FOR VISITORS, published by the Government of Iraq (34 pp. 8 large maps; 6/6d. In Iraq Rs. 4/–). This revised and enlarged edition with accurate folded maps showing roads, desert routes, city of Baghdad, and ancient sites together with 34 large pages of information useful to visitors is of interest to all those who are studying Iraq and practically a necessity for those who contemplate visiting that country.

The notes cover types of information particularly useful to those entering the country or traveling in it. In addition to a brief resume of Iraq history, description of government, and historically important events, the NOTES FOR VISITORS gives information on the climate, motor travel, air transport, passports, foreign consulates, medical facilities and many other features. While hardly a handy pocket size (13½ in. by 8½ in.) the revised and enlarged edition is not bulky and a complete index makes all information readily available.

The eight maps are presented in three colors with water and land routes clearly marked.

MACHINES AND MEN IN RUSSIA, by Louis Fischer (283 pp. $2.50). Mr. Fischer's book is just the opposite of von Eckardt's volume. It is a personal account of a recent visit to Russia. The book is up-to-date, sympathetic, vivid and very easily read. The title is misleading because but very little space is allowed to the "Machines," only one chapter, "Giants," referring to industries, the book being fundamentally individual in its character and primarily covering the relationship of individuals to the new mode of life, only in few chapters departing from the main theme to discuss "Russia and Japan in Manchuria" and "Can Capitalism Plan?" The last chapters portray the two Soviet individuals, Lenin and Stalin, the great leaders of New Russia.

MACHINES AND MEN IN RUSSIA should be read by all interested in Soviet Russia. Much very recent material is available in the book which is still news, and which did not appear in American newspapers. Mr. Fischer is distinctly sympathetic to the Soviets and consequently in places is not sufficiently critical; but on the whole the case for Soviet Russia is presented very ably, truly and impartially. Upon reading this book one feels that the Soviet Government in Russia is firmly established, that it rules with vision and ability and that as the five-year plans come and go the well-being and the standard of living of Russian people will improve rapidly, much more rapidly than would have been possible under the old regime.

RUSSIA, by Hans von Eckardt (711 pp. $7.50). Mr. Eckardt's RUSSIA is not a book to be easily perused by a casual reader, mildly interested in that country; the volume is impersonal and encyclopedic in its character, and as such is of considerable interest, and is a valuable contribution, to the serious students of Russian problems. Indeed in the 700 odd pages of the book there has been assembled a monumental amount of valuable information in the form of numerous quotations, summaries, statistical tables, maps, chronological data and many illustrations, all methodically classified and easily located.

The first 355 pages treat the history of Russia prior to the victory of Bolsheviks on November 7, 1917, beginning with the ninth century when the Slavs first came in contact with the Norsemen. This first half of the book lays the logical foundation for the Russia of to-day and is far better than the following chapters dealing with Soviet Russia, there still being no historic perspective on the latter. Russia of to-day is shown as an inevitable result of her historical background with its despotic and weak rulers, its super-imposed and selfish religion, its class differences and its numerous oppressed minor nationalities. The second half of the book, dealing with the Union of Soviet Socialistic Republics, goes into great details of Soviet history but these chapters are rather only a passive diary of the Soviet Government, with primary and fundamental changes often entirely submerged in the mass of non-consequential events. In this respect the first half of the book does not err, all secondary matters having been wiped out by the passage of time. From very careful analyses of the second half of the book it is possible to segregate and credit the Soviet Government with five major achievements:—

1. Liberation of Russian masses.
2. Revitalization of Russian people with new vigor and enthusiasm, where formerly there was only indifference and passivity.
3. Granting of relative autonomy to minor nationalities within the Federal Union, thus eliminating periodic revolts.
4. Revolutionary development in the economic field through introduction of planned national production and consumption for five-year periods.
5. Development of a form of government, which, though being dictatorial in its character, gauges carefully the desires of the masses and changes its policies radically whenever public opinion appears to demand such changes.

RUSSIA is a monumental effort and one of the best available impartial detail books on Russia, old and new, and it should find its place, primarily as a reference volume, in most libraries where information on Russia is desired.

COMBUSTION IN HEAVY OIL ENGINES by L. J. Le Mesurier and R. Stansfield (pamphlet issued by North-East Coast Institution of Engineers and Shipbuilders). In this paper, delivered before a General Meeting of the Institution in February, the authors discuss qualities necessary for smooth burning fuel of high thermal efficiency for use in Diesel engines. It is made clear that the quality of a fuel for heavy oil engines depends on other factors than those mentioned in the usual run of specifications.

The authors conclude that progress in Diesel engine design depends on the use of highest practicable compression pressure and temperature at the moment of fuel injection.

The authors have recently received the Engineering Gold Medal awarded by the North East Coast Institution of Engineers and Shipbuilders for their work in this book.

LEITFADEN DER TIEFBOHRTECHNIK (Introduction to Deep Well Drilling), by Paul Stein; 3rd revised and enlarged edition. 52 pp. 4.20 Reichsmarks. This small volume is intended as an outline of the tools and methods of drilling deep holes in oil fields and in prospecting for minerals. All the principal types of tools are briefly described and illustrated by cuts and drawings supplied by European manufacturers. Laymen who read German also will find the book of interest.

UNITED STATES

	Daily Production bbl.	Daily Runs to Stills bbl.	Gasoline Stocks bbl.	Imports for week bbl.	California Shipm. East. for week bbl.
Week Ending July 30	2,137,500	2,175,300	61,172,000	348,000	none
	330,600*				
	1,200**				
Week Ending Aug. 6	2,171,900	2,127,600	59,165,000	573,000	70,000
	329,300*				
	2,700**				
Week Ending Aug. 13	2,144,200	2,163,300	59,093,000	841,000	425,000
	322,100*				
	3,950**				
Week Ending Aug. 20	2,110,800	2,128,300	57,974,000	847,000	450,000
	328,850*				
Week Ending Aug. 27	2,114,000	2,104,100	56,844,000	631,000	113,000
	327,700				

Underlined figures indicate improvement in statistical position—decrease in production, runs to stills, gasoline stocks or imports.

* Production of the Rusk-Gregg field, East Texas.

** Production of the Conroe field, Texas Gulf Coast.

Imports and Exports

FOR the month of July the total imports of petroleum products into United States amounted unofficially to but 2,629,000 bbl., of which 1,726,000 bbl. were crude oil and 903,000 bbl. were fuel oil; as compared with 11,474,000 bbl. of petroleum products imported in June, the last pre-tariff month, and represented by 7,869,000 bbl. of crude oil, 1,209,000 bbl. of gasoline and 2,346,000 bbl. of fuel and gas oils. In June of 1931 there were imported into United States 6,375,000 bbl. of petroleum products, represented by 3,978,000 bbl. of crude oil, 964,000 bbl. of gasoline and 1,412,000 bbl. of gas and fuel oils.

The June petroleum exports amounted to 9,502,000 bbl. (as compared with 10,297,000 bbl. in June of 1931), of which 2,791,000 bbl. were crude oil, 3,521,000 bbl. were motor fuel, 1,074,000 bbl. were kerosene, 1,391,000 bbl. were gas and fuel oils and 725,000 bbl. were lubricating oil.

The readjustment of the exports from United States refineries to those in the Caribbean, anticipated because of the tariff, was not yet therefore apparent in June, and consequently the final effect of the tariff on the domestic refineries will not become known until several months have elapsed. It is reported, however, that Venezuelan refineries are operating as usual, apparently indicating that such readjustment has been effected at least in part.

The shipments of crude oil and refined products from California to Eastern ports in United States did not show any unusual increases because of the tariff on foreign products till the end of July, as anticipated and as was reported in the daily press.

Shipments from California to Eastern Ports of United States

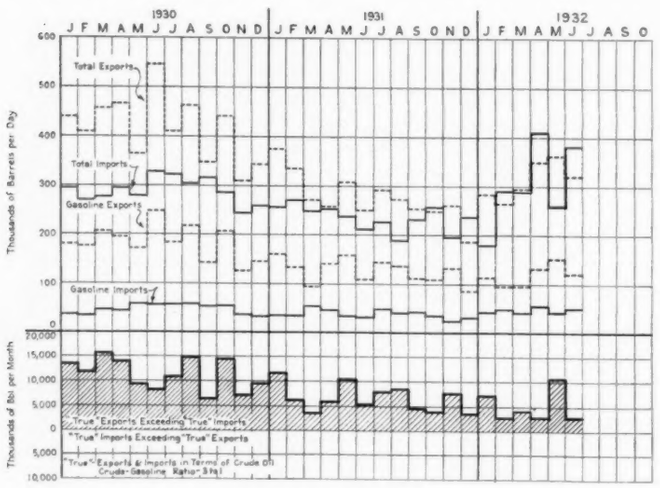
	Total bbl.	Motor Fuel bbl.
Monthly Average in 1930	2,086,000	1,540,000
Monthly Average in 1931	1,468,000	1,155,000
1932		
March	1,165,000	1,046,000
April	946,000	806,000
May	1,241,000	1,072,000
June	738,000	738,000
July	1,307,000	1,147,000

Prices

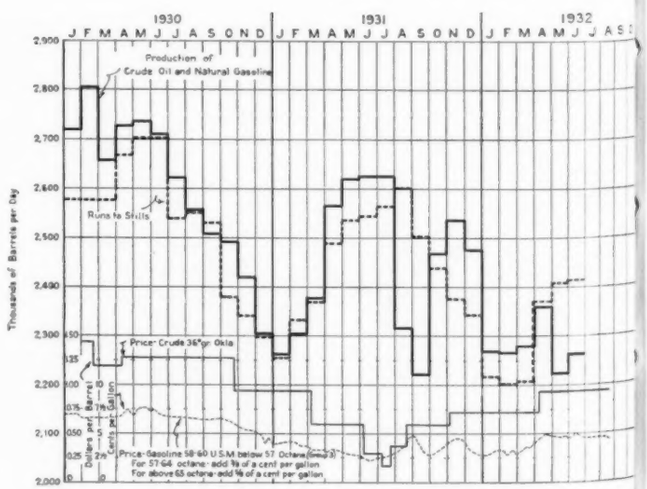
RETAIL gasoline prices at company owned and controlled service stations of oil companies serving New York and surrounding territory were advanced 1½ cents per gallon during the week ended August 27. The advance was originated by the Standard of New York.

Refinery gasoline prices declined two-eighths of a cent per gallon after August 15, and there were indications of further recessions by the end of the month, particularly in low octane grades. Quotations on August 21 were 4⅜–4⅝ cents per gallon for 58–60 U. S. M., 57

Total petroleum exports in relation to imports; gasoline imports and exports; and true exports exceeding true imports.

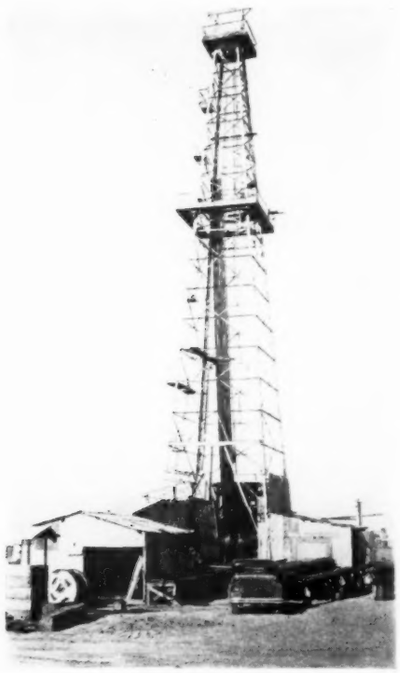

1930
1931
1932
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O
Total Exports
Total Imports
Gasoline Exports
Gasoline Imports
Thousands of Barrels per Day
Thousands of Bbl per Month
"True" Exports Exceeding "True" Imports
"True" Imports Exceeding "True" Exports
"True" Exports & Imports in Terms of Crude Oil
Crude-Gasoline Ratio: 3 to 1

Production of crude and natural gasoline and runs to stills in relation to crude oil and gasoline prices


1930
1931
1932
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S
Production of Crude Oil and Natural Gasoline
Runs to Stills
Thousands of Barrels per Day
Price: Crude 36° or Okla
Dollars per Barrel
Cents per Gallon
Price: Gasoline 58-60 U.S.M. below 57 Octane (see 2)
For 57-64 octane add ⅛ of a cent per gallon
For above 65 octane add ⅛ of a cent per gallon

and below octane rating in Group 3, Oklahoma market; 57 to 64 octane rating, U. S. M., commanded 5–5¼ cents per gallon and 65 and above octane rating grade, U. S. M., was quoted at 5¼–5½ cents per gallon. Gulf Coast prices for export remained steady at 4½ cents per gallon for 58–60 U. S. M.

Natural gasolines weakened considerably, declining five-eighths of a cent per gallon from the previous month, being quoted at 2¼–2⅜ cents per gallon for grade 26–70 (former AA) in Oklahoma and North Texas.



Western Gulf Oil Company's 10,294 ft. well, deepest in the United States.

The demand for kerosene improved, resulting in an increase in prices of five-eighths of a cent per gallon, 41–43 w.w. being quoted on August 21 at 3⅛–3½ cents per gallon, with prices still rising. Gulf Coast prices for export remained unchanged at 4⅜ cents per gallon for grade 41–43 p.w.

Posted crude oil prices remained without change. There were reports that considerable amounts of distress crude oil from East Texas and Oklahoma City pools, illegally produced, were marketed to small local refineries at quotations below the official market. Total volume so produced and marketed was estimated at from 100,000 to 200,000 bbl. per day from both pools (probably actually not exceeding 100,000 bbl.) and the fact that such dumping did not weaken the market appreciably, indicates that the crude oil demand remains strong, though such illegal production cannot continue into the fall and winter without causing general reduction in the posted crude oil prices. Also several larger companies withdrew considerable volumes of crude oil from their storage in the past few months and these companies will welcome the opportunity to replenish their tanks during the coming winter with cheaper crude. Therefore only the continuation of strict and effective proration will prevent the reduction in posted prices in the late fall.

REFINERY runs continue excessive by from 100,000 to 200,000 bbl. per day as compared with the generally recommended figure of 2,000,000 bbl. per day. The only offenders appear to be the Eastern, the Great Lakes and the Gulf refineries which are still running around 70 percent of their capacities, as compared with runs of under 50 percent in Mid-Continent and California plants. Even a small reduction of runs to 60 percent of capacity in the above indicated refineries will reduce the total daily runs in United States to 1,960,000 bbl. and there is no apparent reason why such reduction could not and should not be achieved in order effectively to strengthen the refinery markets and also as a matter of simple coöperation with the Mid-Continent and California refiners.

▼

Supply and Demand Downward Trend Reversed

INDICATED domestic demand for motor fuel during June, 1932, averaged 1,292,000 bbl. per day, an increase of 26.8 percent over the daily average of the preceding month; also 4,000 bbl. per day in excess of the domestic motor fuel consumption in June, 1931, and 7.7 percent in excess of the consumption in June of 1930, thus establishing an all time record for the daily domestic motor fuel consumption, even though by a very small margin and possibly partly due to the pre-tariff accumulation by dealers. This increase is most encouraging if compared with the domestic motor fuel consumption in April and May of the current year which averaged in excess of 10 percent under the corresponding months of 1931. The highest on record daily average domestic motor fuel consumption in June of 1932 must be compared with radical declines in other major industries of United States to indicate the privileged position of the oil industry and its possibilities of showing excellent earnings, provided even a semblance of coöperation within the industry is effected. As a matter of comparison the following data is given:—in June, 1932, the pig iron production averaged 19.7 percent of normal, freight car loadings 50.1 percent of normal, automobile production 47.3 percent of normal, cotton consumption 57.5 percent of normal and the general combined index of business activity 52.8 percent of normal (ANNALIST'S).

Exports of motor fuel averaged 117,000 bbl. per day in June of 1932, a decrease of 21.5 percent under May, 1932, but an increase of 7.3 percent over June of 1931. Total demand for motor fuel thus increased by 0.86 percent in June of 1932, as compared with the same month of the preceding year. On July 1 motor fuel stocks at refineries, terminals and in transit, amounted to 56,264,000 bbl., representing a net withdrawal of 7,082,000 bbl. from the stocks on hand on June 1. At the present rate of total demand motor fuel stocks represent 40 days' supply, compared with 55 days' supply on hand one month ago.

Holdenville—Oklahoma

THE recent extension discovery by the Mid-Continent Petroleum Company of Booch sand production (Pennsylvanian) in section 9 of Township 7 North Range 8 East in Hughes County and surrounded in all directions by small oil and gas pools is causing a minor drilling campaign in sections 9, 10, 15 and 16 of that township. Six oil wells have been completed recently and some 20 more are being drilled or will start soon in this extension. Initial production from the Booch sand, encountered in this area at around 2900 ft., varies from 500 to 1,200 bbl. per day, and is usually accompanied by a large volume of gas, in some instances as high as 35,000,000 cu. ft. per day. Recovery per acre from the Booch sand is small and consequently the new Holdenville extension is not of great consequence in the proration problem.

Western Kansas

SKELLY Oil Company No. 1 Liesman in the Miles field (No. 50 on the WORLD PETROLEUM map of Western Kansas pub-

lished on page 107 of March, 1932, issue), which so far had only two shallow wells producing from the Lansing formation of Pennsylvanian age, has been drilled to the Arbuckle limestone of Cambro—Ordovician age and with a total depth of 4195 ft., and 102 ft. into the Arbuckle, is making 20,000,000 cu. ft. of gas and spraying 120 bbl. of light oil. Past experience with Arbuckle limestone assures this well, or other wells in this field, of large flowing production and since Miles field is 30 miles from the nearest large flush production (Richardson pool, No. 38), the new producer is definitely of major importance.

Distribution of Western Kansas Producing Areas

County	Pool and Its No.		Number of Wells	Potential bbl.
Barton	Davidson	20	1	150
	Isern	33	2	1,073
	Scheufler	new	1	700
Ellsworth	Heiken	23	2	2,382
	Stoltenberg	21	5	5,276
	Stratman	22	11	16,607
Rice	Beyer	30	1	250
	Orth	new	1	1,800
	Ploog	27	1	2,000
	Schurr	34	12	11,988
	Sharpe	35	3	2,090
	Steckel	new	1	150
Rush	Greenwalt	29	1	50
Stafford	Richardson	38	4	4,900

Western Kansas areas including 46 prorated wells had a potential of 49,616 bbl. per day on August 1 distributed as indicated in the accompanying table.

New locations in Kansas average from 15 to 20 per week, indicating considerable wildcat and development activity.

Proration—Texas

SOME uncertainty exists in Texas in connection with the election of the next Governor. In the first Democratic primary elections Mrs. Miriam A. Ferguson, former Governor, had a lead of 105,000 votes over Governor R. S. Sterling in his campaign for renomination. The second run off primary elections will be held August 27 and that election will determine which candidate will be the Democratic nominee. Inasmuch as Democratic nomination is equivalent to election in Texas and because Mrs. M. A. Ferguson's attitude towards strict proration is undetermined, the whole curtailment program of the State is subject to the coming elections.

▼

Texas Gulf Coast in Rapid Development

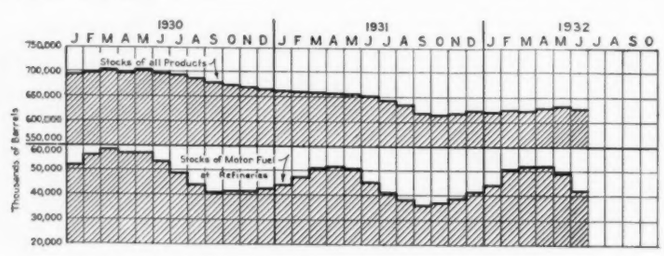
IN THE past month seven oil wells were completed in the Conroe field, bringing the total number of successful completions to eleven, ten of which are oil wells and one a gas well not yet deepened to the oil pay sand. All wells have had an initial production of about 1,000 bbl. per day, due entirely to choking in as soon as completed. Therefore, the choked potential of the Conroe pool is now around 11,000 bbl. per day, while the open flow potential is probably around 30,000 bbl. per day. New completions in the past month extended the field half-a-mile west and the same distance south from its former southwest limit, other completions being within proven area, or only offset extensions. Currently there are 13 drilling operations in the Conroe field. The most important well, now nearing completion, is the Humble Oil and Refining Company No. 1 Dobbins, Ransom House Survey, two miles due south and east from present production. This drilling, after correlating high on upper formations, is coring ahead at 5083 ft. having missed oil sands and failing to find any evidence of oil except a good odor of gas and distillate. Present interpretation of this field is therefore that of a deep buried salt dome, very much smaller than Van in extent and in relief, with production found so far on its northwest flank. Producing sand apparently lenses out over the top of the structure. Only further drilling will determine whether sands and production extend all around the presupposed deep-buried dome, or whether it is limited to some portions of it.

During the past month Conroe was definitely limited on the north and on the west flanks by four dry holes. Humble Oil and Refining Company No. 3 South Texas Development Company, Theo. Slade Survey, failed to extend production on the west side, this test being one-third of a mile west from Heep and Houston Companies' No. 1 Hamman and from Gulf Coast Drilling and Producing Company's No. 1 South Texas Development Company. Heep and Houston Companies' No. 1 Brent half-a-mile due north from the east end of the field was a failure in the oil pay, encountering salt water when bailed in to 5182 ft., but this well was saved as a small gas well when plugged back to 5010 ft. Two other dry holes, both drilled by Rowe and Flowers, were fairly distant locations and were not expected to produce.

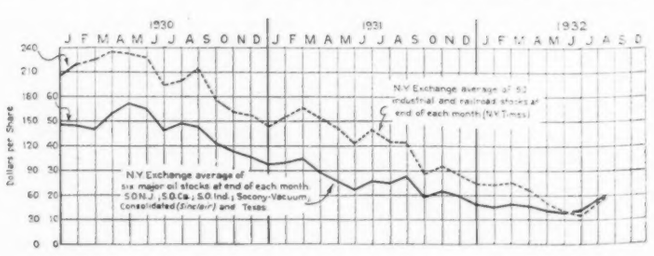
The total indicated proven area of the pool is now estimated at 7,000 acres, of which total the Humble Oil and Refining Company (S. O. N. J.) owns, or controls, 4,500 acres, or 64 percent. Considering that when the Conroe field was first discovered the Humble was only slightly represented in its immediate vicinity the purchases by that company within this year have been most remunerative, adding greatly to the Company's crude oil reserves. Such a policy also served to exclude a number of smaller operators from the Conroe pool and it will undoubtedly result in saner development. Under present division of acreage only the northeast end of field will develop an active drilling campaign, but even there locations should not exceed 20.

On August 9 the Texas Railroad Commission reduced the maximum production per well in the Conroe pool from 400 bbl. per day, temporarily allowed and purchased by the Humble Pipe Line Company

Relation of stocks of all petroleum products to gasoline stocks.



Six major oil stocks in relation to 50 industrial stocks on the New York Stock Exchange.


1930
1931
1932
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O
N.Y. Exchange average of 50 industrial and railroad stocks at end of each month (N.Y. Times)
N.Y. Exchange average of six major oil stocks at end of each month S.O.N.J., S.O.Ca., S.O.Ind., Socony-Vacuum, Consolidated (Sinclair) and Texas
Dollars per Share
240
210
180
150
120
90
60
30
0

(S. O. N. J.), to 220 bbl. The new order provided for 40 bbl. allowance per well, plus nine barrels for each acre in the lease, to the maximum of 220 bbl. New hearing will be held August 30, after which new regulations will be issued by the Texas Railroad Commission.

In the short life of the new field the proration enforcement won a point when Federal Judge T. M. Kennerly of Houston denied the Alpha Petroleum Company a temporary restraining order to prevent the Railroad Commission from enforcing proration.

Texas Pipe Line Company completed a 6-in. line into the Conroe field, this being the second line to serve the field, the Humble Pipe Line Company having now in operation an 8-in. artery. Texas Pipe Line Company's line was completed anticipating that Company's production on its two leases in the Conroe, and in the meanwhile the line is serving as a carrier.

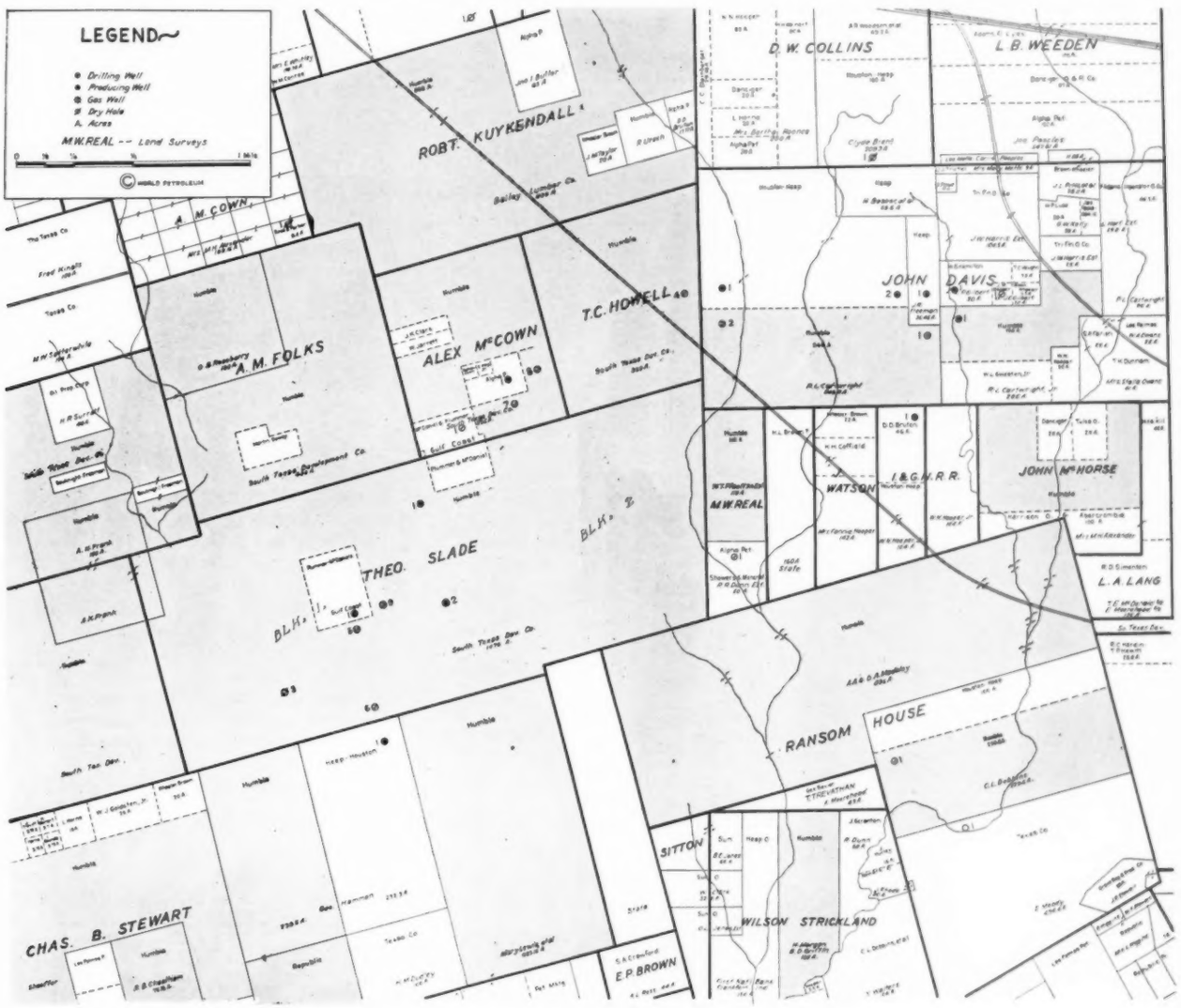
Victoria County—Texas Gulf

GULF Production Company (Gulf Oil) and Victoria Oil Company No. 2 Keeran Ranch, Martin DeLeon Survey, located on a 5,000-acre block, was completed on August 13 flowing 1,500 bbl. of 37 gravity oil from sand encountered at 5841–5851 ft. This well is equivalent to a new discovery because the first well in this district, 200 ft. due east from No. 2 Keeran Ranch, was completed in January of the current year as a 40,000,000 cu. ft. gas well with a total depth of 5191 ft. The nearest production from this area is 20 miles due southwest. The field is already defined on its northeast edge where Cullan and West's No. 1 Keeran Ranch tested salt water with a total depth of 6606 ft. As is the case with the Conroe pool, the Keeran Ranch field is within a few miles of the Gulf Coast.

Colorado County—Texas Gulf

COYLE—Concord Oil Company No. 1 Nelson, I and G N Survey, section 43, a rank wildcat 40 miles from nearest production and the first commercial producer in Colorado County, was completed late in July for an estimated 50,000,000 cu. ft. of gas per day under a pressure of 1,500 lbs. from a total depth of 4052 ft. Considering the performance of Conroe and Vic-

Conroe Field—Texas Gulf Coast: shaded areas are controlled by Humble Oil and Refining Company.



toria wells, first gassers in shallow horizons, then oil producers in deeper sands, the Coyle-Concord well has a good chance to produce oil from deeper sands of Jackson formation. The Coyle-Concord No. 1 Nelson is in the middle of a 20,000-acre block and consequently it is not a threat to the oil industry in case oil is eventually discovered with deeper drilling. The new area is some 60 miles from Houston port facilities and is therefore located very strategically to Gulf Coast refineries and for export.

Tuleta-Bee County—Texas Gulf

C. F. NICHOLS, et al, No. 1 Harris, a wildcat three miles due south from Pettus field and three miles due north from Normanna field, encountered saturated sand at 4087 to 4098 ft. and was brought in with an initial production of 600 bbl. of crude oil per day, accompanied by 8,000,000 cu. ft. of gas, thus opening a new field named Tuleta. Two additional wells are now nearing the sand, and several other projects have started. The new field is already connected to Humble Pipe Line Company system. Tuleta field is but 50 miles from the Gulf Coast.

The Texas Railroad Commission in coöperation with operators in the new field fixed an allowance of 150 bbl. per well per day and the gas-oil ratio not to exceed 2,000 cu. ft. per barrel of oil lifted.

Rusk-Gregg—East Texas

PER well per day allowance in the East Texas field was reduced to 44 bbl. for the first half of August and to 43 bbl. for the second half of the month.

At the close of August there were in the East Texas field 7,750 producing wells, an average of one well per 14.2 acres of the proven area of the field. Cumulative recovery from the field reached about 185,000,000 bbl. by September 1, an equivalent of 1,680 bbl. per acre of its proven area. Rate of new locations continued to decline appreciably falling to below 100 per week, while completions continued at around 150 per week. Initial production of new completions declined greatly, and at the same time the by-passing and theft of oil, estimated as high as 100,000 bbl. per day, but actually probably not over 50,000 bbl., served effectively to reduce locally the bottom hole pressures and also to draw salt water into a number of structurally high wells. A close study is being made by State authorities to detect and to stop illegal production, but such work is handicapped at the present moment by the uncertainty of political situation in connection with the gubernatorial elections.

BASIL B. ZAVOICO

RUSSIA

Official Figures of Soviet Oil Operations*

	Crude Production (bbl.)	Daily Average (bbl.)	Run to Stills (bbl.)	Drilling (feet)
January	13,059,900	421,300	11,927,882	152,532
February	12,194,000	420,482	11,428,900	193,185
March	13,852,300	449,197	12,866,700	240,433
April	13,101,200	436,707	12,737,200	250,854
May	13,437,200	433,461	13,057,800	262,295
June	12,971,700	432,390	12,917,100	248,138
July	12,923,400	316,884	12,256,300	222,342

Revised quota 1932—191,800,000 bbl. or 525,400 bbl. daily average.

*Crude oil conversion ratio—seven bbl.—one ton.

IN LINE with the general trend of industrial activity the oil industry of Soviet Russia has slowed down operations during the month of July to a considerable extent and while the arrears of crude production for the Baku oil fields during the first six months of 1932 as compared with the plan aggregated 3,640,000 bbl. the arrears of the plan during the 31 days of July have run up to over 2,100,000 bbl. of crude (for the 31 days only).

Total plan fulfillment of the oil industry during July amounted to about 79 percent of the plan for the month.

July Plan Fulfillment

Trust	Percent	Trust	Percent
Azneft	77	Sakhalin	50
Grozneft	87	Turkman	50
Maikop	58	Middleasia	75
Emba	50		

Arrears at Baku are largely explained by lack of all kinds of pipe and particularly in the division of deep pumping as well as compressor production and there are at present over 600 wells which had to be shut down for this reason.

The ills of Grozneft, where the daily average of crude production has decreased by about 30,000–35,000 bbl. are rooted much deeper and are being ascribed to laxity of technical supervision. Inefficiency and lack of organization have considerably reduced the productivity of the engineering force as well as of labor. Individual wells which require special treatment are being neglected, sand avalanches, flooding of wells and other evils have become frequent events in the oil fields of Grozni.

Total drilling during the month of July amounted to 67 percent of the plan to which Azneft contributed 65 percent and Grozni 55 percent.

Run to stills during July with the total of 12,256,300 bbl. amounted to about 87 percent of the plan for the month with individual plan fulfillment of Azneft—87.7 percent; Grozneft—91.9 percent, and Neftezavodi—80.6 percent.

Total crude production for the seven months ending July 31, 1932 of 90.7 percent of the plan represents an increase over the figure for the corresponding period of last year of 4.5 percent, while drilling with 84.6 percent of the plan has increased over last year 6.3 percent and run to stills which amount to 93.2 percent of the plan during the first seven months of 1932 show an increase over the corresponding period of last year of 12 percent.

Fuel Conference

THE first fuel conference of Soviet Russia took place in Moscow during July. The purpose of this conference was to discuss and to check up on the fuel balances and reserves of the country which will be available during the Second Five Year Plan period (1933–1937). Attention was also given to methods of rationalization of production and exploitation as well as the rational utilization of the resources at hand and the opening of new fuel basins in order to meet growing demand. Reports and papers on the various subjects under discussion were read by Lomoff (Former head of Napthasyndicate) and Kossior (Head of Fuel division of the Commissariat for Heavy Industries). During the conference an exhibition was held by the Research Institutes for Fuel of all kinds of combustibles available in the country.

During the first Five Year Plan the fuel industries of Russia made remarkable strides and completed the plan in less than the time required. New coal and

oil locations were discovered and brought under production and advanced methods of exploitation have been introduced including the use of low grade fuels and utilization of waste. However, the general fuel base of Russia at present is still coal and this industry is lagging behind the progress and development of other industries which are dependent upon coal as fuel, particularly the heavy industries of the country.

In 1930 the volume of consumption of fuel had exceeded the rate of production and in 1931 with growing requirements, considerable depletion of the stocks had taken place. Production of fuel in Russia during 1931 amounted to 76 percent of the plan while consumption proceeded at the rate of 85 percent and the stock of all fuels above ground receded from 14,500,000 tons in 1930 to 12,000,000 tons in 1931. Quality of the stocks on hand were lowered considerably owing to the large increase of nonportable stock in general and the increase of stocks held by the mines which were far from points of consumption.

Fuel Sources Available for 1932

Wood Combustibles in cubic meters converted into tons (140,000,000 c.m.)	140,000,000 c.m.
Peat in weighted tons	16,000,000 tons
Shale in weighted tons	600,000 tons
Coal (Don Basin 56,000,000 tons)	90,000,000 tons
Oil and Gas (Fuel oil, 17,500,000 tons)	27,500,000 tons
All other fuel	1,100,000 tons
Converted into Fuel value	130,500,000 tons
Consumption (expected) total	116,100,000 tons

At present oil represents 20 percent of the consumption of all kind of fuels in Soviet Russia and the ratio is expected to grow in measure with the increased output of tractors and growth of motor transportation.

Comparison of Calority of Russian Fuels

	Calories BTU
Oil Fuel	9,500–10,500
Goudron	7,000– 9,000
Coal	5,000– 7,500
Peat	3,500– 4,500
Wood	3,000– 3,500

▼

Events of the Month—July

Baku. At Puta a gusher has been opened yielding over 3500 bbl. of light oil per day from a depth of about 2300 ft.

Ishimbayevo (Bashkir republic). Of the 10 wells drilled at Sterlitamak since the beginning of the year five wells are under operation.

Temir. Several wildcats started at locations between the Caspian sea—Sterlitamak and down to Ukhta have produced evidence that the general oil strata all along this line are situated at a depth varying between 1200 to 1400 ft. and that the strata have a width of about 35 ft. There are also indications that owing to high underground pressure of gas deeper located horizons will yield prolific gushers of high grade crude containing more than average volatile hydrocarbons.

Makhatch Kala. Drilling at Daghestan has produced evidence of large oil deposits in the district. Berg Bash and Kayakent are the most promising locations of this region and are expected to become similar to Grozni in importance as oil fields. The newly discovered oil location consists of an area which covers 10 square kilometers in the northern district of Daghestan stretching down to Sulak river.

Blagoveschensk. The shipbuilding yards of this city have completed several oil barges which will be used for the transportation of crude from Sakhalin to Khabarovsk and Vladivostock where refining capacity and cracking units are at present under construction.

Amur. Oil has been discovered in the Soviet Far East near the village of Ushkovo which is in the district of Svobodnensk. Casual drilling done in this region has struck a strata of sand stone mixed with clay richly saturated with an oily liquid of a strong petroleum odor. The oil location is situated between the villages of Ushakovo-Ust Chermushka and Alekseevka which form a triangle at the splitting of the rivers Amur and Belaya. The presence of oil in this region was reported in prewar days; but exploration yielded no results till this year.

Samara (Volga River). Drilling near Sizran at depths of about 2000 ft. has yielded indications of the presence of large oil deposits. At a depth of about 1800 ft. a strata has been struck which was saturated with a liquid of a strong benzol odor. The width of the strata is about 160 ft. and the oil saturation increases with the depth of drilling.

Armavir. The Armavir-Ukraine pipeline is gradually nearing capacity operation, while the tank farms at the terminals and intermediate stations are nearing completion. At present the following number of tanks are in use at the various pumping stations of the pipeline. Six tanks at Armavir, five tanks at Bataisk and nine at Trudovaya. The main pumping stations of the line at Ostrade-Kuban, Tikhoretzkaya, Rostov as well as the others are working at present under full load.

The five vacuum pipe still units ordered from Alco Products of New York are expected to be completed and brought into operation during the third quarter of 1932. The vacuum units are expected to be operated as follows: Two vacuum stills with the two Badger refineries, one with the Graver refinery and two with other refineries of domestic make. The Alco units are to process reduced crude and are expected to yield 5 percent of heavy gasoil, 10 percent solar oil distillate, 2 percent spindle oil, 13 percent machine oil, 8 percent light cylinder distillate, 7 percent heavy cylinder distillate, and

Russian Petroleum Exports from Black Sea Ports—First Half, 1932

(Barrels of 42 U. S. Gallons)

	Gasoline	Kerosene	Lubeoil	Fueloil	Total
Italy	907,819	138,543	21,773	2,772,961	3,841,096
France	1,472,497	33,991	80,937	1,375,000	2,962,425
England and Ireland	783,075	680,695	157,024	626,477	2,099,448
Germany	1,125,417	67,241	197,675	543,409	1,933,742
Spain	1,281,446	46,073	9,393	252,655	1,589,567
Belgium	723,840	14,089	224,033	522,445	1,484,407
Egypt	11,360	240,833	.....	557,016	809,209
India	.....	610,343	7,003	52,882	670,228
Algeria-Morocco Tunis and Senegal	77,497	.....	.....	557,608	635,105
Baltic States and Finland	257,748	58,765	.....	134,328	450,841
Scandinavia	225,036	.....	.....	184,419	409,455
Turkey	64,949	29,336	.....	283,140	377,425
Greece and Yugoslavia	87,982	33,157	10,445	213,582	345,166
China	63,675	226,119	.....	34,904	324,698
Holland	120,371	8,338	.....	47,871	176,580
Syria and Arabia	8,066	74,715	.....	12,131	94,912
Brazil, Chile and Uraguay	33,918	14,730	.....	.....	48,648
All other	214,109	.....	.....	107,176	321,285
Total	7,458,805	2,276,968	708,283	8,278,004	18,722,060

10 percent residue which will be further processed for asphalt at an installation erected in conjunction with the Alco units.

Caspian Sea-Orsk Pipeline

OVER 7,000,000 bbl. of petroleum products per annum are being consumed for industrial and agricultural purposes by the Eastern districts of Soviet Russia and this figure is expected to grow with the success of mechanization of industries and industrialization of agriculture.

These districts at present receive oil products from Baku or Emba by tankers via the Caspian sea and the Volga river at the terminal of Samara, where the oil products are relayed into tank cars to be carried by rail to the East. Such transportation is rather complicated and costly. It has therefore been decided to build the Caspian Sea-Orsk pipeline.

The starting point of the line is Guryeff on the Ural river which is a tributary of the Caspian sea and the central point of the Emba oil fields. The line will be laid over the steppe of Kazakstan over a distance of about 460 miles with seven intermediate pumping stations and a terminal at Orsk. Initial capacity of the line will be 10,500,000 bbl. of crude with provisions for enlargement up to 21,000,000 bbl. per annum. At Orsk large refineries and cracking facilities are to be built with a capacity of 21,000,000 bbl. of oil per annum and extensive bulk storage will be erected at Guryeff, Makhat, Dossor and Orsk. The line is scheduled for operation November 1, 1933 and total cost is estimated at 83,000,000 Rbl. ($41,500,000 nominal exchange).

During the Second Five Year Plan (1933–1937) the Caspian Sea-Orsk pipeline will be extended east to Kurgan where several refineries will be erected for a total yearly capacity of 10,500,000 bbl. of crude. The distance between Orsk and Kurgan is about 750 kilometers and at the end of 1937 the pipeline Caspian Sea-Orsk-Kurgan will aggregate a distance of 1,500 kilometers (940 miles) and will handle a total quantity of 35,000,000 bbl. of crude per annum being the longest and largest pipeline in Europe.

The pipeline has been divided into several sections and building operations were begun in June of this year. The line is to start operation about the end of 1933. The winter months between October and March are not suitable for building operations due to the inclement weather and the complete lack of water which has to be carried 400 kilometers from Guryeff (Ural river) by rail tank cars.

At present the Emba fields are producing about 2,300,000 bbl. of crude per annum. It is, however, expected that production of these fields will increase considerably during the Second Five Year Plan and until then Baku crude will be supplied to Orsk.

VOSTOCKNEFT has been formed as an oil unit of Soviet Russia for the purpose of exploration and drilling of oil locations in the Emba-Ural district. The main office of Vostockneft is Sverdlovsk where a special department of supplies is being maintained.

Trading offices are being maintained at Meskovo and Perm and at Perm a branch of the Petroleum Research Institute has been established. The Sergiensk machine plant has been alloted to this oil unit for the purpose of building drilling equipment.

J. WEGRIN

▼

VENEZUELA

DEVELOPMENT at the interesting Cumarebo field of the Standard of New Jersey is progressing favorably. Some seven wells have been driven and eight or ten new locations are being prepared. The wells already in production yield over 9,000 bbl. per day. Cumarebo No. 11 came in with oil at 45.7 deg. gravity, A. P. I.; and No. 12 yielded over 400 bbl. daily, of oil of 46.6 deg. gravity, A. P. I. Oil from this field is of higher gravity than any other Venezuelan crude yet brought in.

The company has been building tanks for storage on the Caribbean shore of the state of Falcon, to take care of the crude from this field. It has also constructed six kilometers of 6 in. pipe, from the field to the shore, and some 6,000 ft. of 11¾ in. sea-loading submarine line, running out to a minimum depth of 38 ft. Shipments have already begun from the Cumarebo field.

The Standard's steamer PIONEER, which has been in service at the Quiriquiri field, transferring crude from the land tankage to the barge at deep-water loading point, has recently been used for shipments of crude to the Pan-American refinery at Aruba, two such shipments having been made recently.

It is also of interest to note that Colombia crude has also been shipped to the same refinery at Aruba. These shipments doubtless are the direct result of the new tariff on oil imports in the United States, and they likewise point to the recent acquisition of the Pan-American foreign business by the Standard of New Jersey.

Barco Concession

IT IS satisfactory to know that the long dispute and voluminous litigation over the Barco grant has at last been terminated, and that the Gulf Oil Company is now in exclusive possession of that concession. It is understood that satisfactory settlements have been made with the minority interests and that all hostile litigation has been withdrawn.

Under the agreement with the government of Colombia, the Company is to undertake and prosecute the drilling of wells until assured of no commercial production or until a daily minimum production of 21,000 bbl. is attained. Some 125,000 acres are to be exploited in the Catatumbo field within the next five years, and within ten years this area is to be extended to 500,000 acres. There are further provisions concerning the construction of a pipe line to the Caribbean coast, and the erection of a refinery in Colombia, as soon as production warrants. There is provision for an annual cash payment to the government, until the government's royalty on crude production reaches 10 percent. of the field product.

Venezuelan Field

IN VENEZUELAN fields generally, production is still being held back, and so long as present conditions in the industry remain as they have been, the companies are not expecting to extend development.

As Venezuela is suffering, like the rest of the world, from the protracted industrial and economic depression, consumption within the country has fallen off very considerably. This condition affects chiefly the Royal Dutch-Shell interest (The Caribbean Petroleum Company) and the Lago Company, the only Venezuelan producers refining and marketing within the country, to any extent.

MEXICO

Exploration

SUCCESSFUL completion of a producing well in Buena Vista near Panuco, Vera Cruz state, at a depth of 2,227 ft. with a daily production of approximately 57 bbl. has been greeted with considerable enthusiasm by the Pretroleum Department of the Ministry of Industry, Commerce and Labor. This is the first producer brought in in this zone in over five years although several wells have been sunk, some to greater depths than the present well. Bringing in of this well is said to have precipitated several requests for drilling permits in this zone. The Petroleum Department has granted permits to Mexican Eagle Oil Company to drill in Tonala and El Burro fields near Puerto Mexico in Vera Cruz. The successful well was completed by Compania Independiente Petroleos Nationales.

Another well whose importance has impressed the Ministry of Industry, Commerce and Labor has recently been brought in in the Nueva Rosita region of Coahuila state. Details about the well are entirely lacking at this time except that it reached oil at 1,250 ft. and produces an abundant supply of high quality crude. To uncover further details the Ministry has sent engineers to the well to report on it. Its importance is due to the fact that in this region also, oil was not anticipated.

Exports

VIRTUAL elimination of the United States as a customer for Mexican oil has led to extensive search for new markets by companies operating in Mexico. In this effort they have received the encouragement of the Ministry and have been favored with several suggestions from the same source.

Attention has first been turned to Holland according to a report from the Mexican consul in Rotterdam. Mexican oil has been well received there and has been used in testing motors by the Bolinder Motors Manufacturing Company. This fact has led to an intensive publicity campaign in Holland according to reports in EL NACIONAL, Mexico City daily, but the names of the companies backing the publicity campaign have been withheld. Plans are said to include chartering a fleet of tankers and extending the uneconomical business of marketing Mexican oil in Europe to Norway, Sweden and Germany. Oil company officials in Mexico City expressed themselves as entirely unacquainted with any such plan but felt that it was a natural outcome of the U. S. tariff which should force supplies on world markets.

A second plan including far sounder elements and suggested by the Ministry of Industry, Commerce and Labor consists of a serious effort to capture Central American markets now being supplied by the United States. Geographical situation of Mexico makes this a logical market for surplus Mexican production and might, according to the Ministry, be developed to quite a scale. Ministry urges other government departments to cooperate in an effort to facilitate concerted action on the part of oil companies operating in Mexico. It has been suggested that the port Salina Cruz be reconditioned and that the railroads offer a preferential rate for the transportation of oil destined for Central America.

Mexican exports of crude and refined products for the first five months of 1932 showed a considerable increase in comparison with sales abroad during the corresponding period of 1931 as a result of efforts to get oil into the United States before the tariff became effective. Exports of gas oil, kerosene, and asphalt showed a decrease in comparison with the corresponding period last year.

World Oil Production—Official Figures

All figures furnished direct to WORLD PETROLEUM by Governments, except where otherwise specified

(Figures in U. S. barrels—Conversion ratio 7 bbl. = 1 ton)

Country	Total 1931	Daily Av. 1931	January 1932	February 1932	March 1932	April 1932	May 1932	June 1932	July 1932	Daily Av. 1932
United States	850,275,000	2,329,520	66,884,000	62,484,000	67,189,000	67,717,000	63,523,000	64,835,000	66,937,000[3]	2,157,600
Russia	156,342,900	428,336	13,059,900	12,194,000	13,852,300	13,101,200	13,437,200	12,971,700	12,923,400	429,764
Venezuela	120,069,462	328,957	9,939,027	9,469,873	10,398,514	10,870,615	11,219,908	11,151,490	9,822,428	342,121
Roumania	46,333,945	126,942	3,780,000	3,439,100	3,621,170	3,557,470	3,748,710	3,745,238	3,750,000[4]	120,383
Persia[2]	40,149,977	109,999	3,228,780	2,834,090	3,516,611	3,488,674	3,942,933	4,195,933	4,795,623	122,078
Mexico	33,038,853	90,517	2,869,177	2,761,064	2,967,842	2,922,309	2,926,574	2,701,184	2,505,879	92,272
Dutch East Indies	32,818,346	89,913	3,943,147	3,652,432	2,844,065	2,923,382	2,865,261	2,963,350	3,185,252	105,056
Colombia	18,237,190	49,965	1,533,969	1,401,554	1,668,508	1,655,922	1,682,223	1,627,377	1,455,599	51,761
Argentina	11,713,049	32,091	1,116,800	1,040,000	1,192,700	1,078,500	1,057,200	1,001,000	1,067,000	35,461
Peru	10,102,116	27,677	945,231	750,804	697,622	732,308	757,404	785,040	634,632	24,897
Trinidad	9,743,763	26,693	846,878	828,860	874,145	852,080	859,609	839,248	883,102	28,093
British India	7,830,101	21,452	750,251	698,645	719,337	681,942	739,570	672,613	700,000[4]	23,297
Poland	4,397,760	12,049	351,365	324,100	334,495	336,231	340,200	336,000	351,603	11,145
Sarawak	3,338,472	9,146	210,748	200,102	197,050	191,282	187,859	177,023	180,000[4]	6,310
Japan and Taiwan[1]	1,884,285	5,162	195,000	195,000	195,000	195,000	195,000	195,000	195,000	6,408
Egypt	1,845,938	5,057	138,796	137,431	142,275	151,305	146,489	152,712	150,000[4]	4,784
Ecuador	1,750,633	4,796	126,406	111,361	126,024	133,844	139,389	137,437	143,010	4,307
Canada	1,583,339	4,338	96,912	90,841	97,484	95,585	95,221	89,533	86,969	3,063
Germany[5]	1,778,602	4,873	148,197	150,197[4]	262,528	141,780	150,000[4]	150,000[4]	150,000[4]	5,411
Iraq[2]	1,200,000	3,290	100,000	100,000	100,000	100,000	100,000	100,000	100,000	3,286
France	512,862	1,405	46,000[4]	46,000[4]	46,000[4]	46,000[4]	46,000[4]	46,000[4]	46,000[4]	1,511
Others[1]	338,700	929	36,000	36,000	36,000	36,000	36,000	36,000	36,000	1,183
	1,355,285,293	3,713,109	110,346,584	102,945,454	111,078,670	111,008,429	108,195,770	108,908,878	110,098,497	3,580,191

[1]Estimate. [2]Anglo-Persian Oil Co. figures revised; fuel oil returned to the ground has been deducted. [3]A. P. I. [4]No production in Thuringia January 13 to March 10. [5]Including Thuringia. Sakhalin (Russian) included with Russia. Sakhalin (Japanese) included with Japan.

Mexican Exports Jan.–May 1931–32

(Barrels of 42 U. S. gallons)

	1931	1932
Crude Petroleum	5,650,014	4,070,800
Fuel oils	2,864,148	1,042,281
Motor Fuel	960,979	789,159
Lubricants	218,755	151,732
Gas oil	402,519	443,171
Kerosene	474,672	711,857
Total	10,571,087	7,209,000
Asphalt (Metric tons)	72,419	91,175

Michel Appointed Minister

GENERAL satisfaction was expressed in Mexican oil circles at the appointment of Lawyer Primo Villa Michel as Minister of Industry, Commerce and Labor to succeed General A. L. Rodriguez who has become Minister of War and Marine. Villa Michel was formerly subsecretary of the Ministry which he now heads. He has gone on record as entirely in favor of continuing the policy inaugurated by his predecessor in regard to developing Mexican oil resources along national lines of conservation. A feeling is generally expressed that the Minister should be allowed to hold office long enough to formulate and begin his program. Frequent changes in the Ministries has given rise to dissatisfaction of late.

Natural Gas

A NATURAL gas service for Monterrey, Nuevo Leon, has been inaugurated supplying gas for heating, cooking and illumination purposes. Gas is supplied from wells at Mier, Tamaulipas, at the rate of approximately 22,000,000 cu. ft. per day.

R. R. Use of Coal Urged

IN AN effort to relieve acute conditions in the coal fields of Coahuila state members of a convention held in Sabinas have formed a committee to urge National Railways of Mexico to replace oil fuel with coal. If the road does not voluntarily comply, which seems unlikely, coal producers are going to urge the Ministry to insist that coal be used at least in the Coahuila section of the National Railways.

DOUGLAS GRAHAME

▼

SYNTHOLUBE, Standard of Indiana's new synthetic super lubricant will be put on the market in a few select service stations where it is expected that its unusual qualities of resistance to temperature change will recommend it to operators of high priced automobiles in spite of the necessarily high price that will have to be charged. SYNTHOLUBE will be sold only in five-gallon drums at ten dollars per drum.

CANADA

Imports

CANADIAN imports of crude during June were up slightly at 3,255,668 bbl. compared with 3,129,086 bbl. in May of this year, and 3,352,603 bbl. during June of 1931.

Origin of June Canadian Imports

	Bbl.
United States	2,351,295
Colombia	232,931
Peru	453,595
Venezuela	217,847

Gasoline imports were sharply down at 198,269 bbl. in June compared with 244,109 bbl. in May, and 269,173 bbl. in June of 1931.

General Developments

WORK is well advanced on the small refinery being built by the Direct Oil Refinery, Limited in Winnipeg. Plant will consist of a still, multiple deck fractionating bubble tower, and the usual storage tanks.

Work is also proceeding according to schedule on the new refinery of the Shell Oil Company, of Canada, Ltd., in Montreal East.

Imperial Oil has placed its Fort Norman well on a commercial basis, and has made its first delivery of 1,000 gallons of crude oil to the new Great Bear Lake mining district, where it is being used in Diesel engines for primary power purposes.

Tanker Investigation

THE inquiry into the tanker CYMBELINE disaster is bringing out some interesting information regarding the storage of crude oil. It will be remembered that the CYMBELINE was seriously damaged by going ashore at Anticosti Island, and made the port of Montreal with extreme difficulty. After arrival she was drydocked for repairs, and some weeks later, when the repairs were practically completed, three severe explosions occurred with serious damage to the ship, and with heavy loss of life among firemen and drydock workers. It was thought at first that the explosions originated aboard the ship; but the inquiry has fairly definitely established the fact that this was not so, and that they occurred within the drydock itself.

The inquiry has brought out the fact that the mixture of oil and water in the damaged tanks of the tanker was run into the ballast tanks of the drydock. The repairs to the tanker presented several problems that are somewhat unique, and probably deserve to go on record. After grounding, water entered some of the damaged tanks of the ship, creating a mixture that, according to consulting chemists was to all intents and purposes, an emulsion. This mixture of oil and water, naturally, had to be removed before the repairs to the ship could go on, and the question arose as to what could be done with it. Naturally, no one wanted it; regulations forbade it being pumped into the harbor, and yet something had to be done with it. It was finally decided to run it into the ballast tanks of the drydock itself, and actually there was not anything else much to do. It was hoped that, if left quietly, the oil and water might separate which would allow the oil to be pumped out and disposed of through regular channels.

Just what caused the explosions will probably never be known definitely; but the findings of the inquiry will probably establish regulations to cover the disposal of oil under similar circumstances.

General Conditions

ENQUIRIES of Canadian oil companies indicate a falling off in gasoline consumption this year of from 10 to 15 percent compared with last year. One official reports that utility gallonage has held up remarkably well; but that gallonage for private use has shown a considerable falling off. This condition is more apparent in the western provinces of this country than in the east, and the province of Saskatchewan appears hardest hit in this connection.

R. C. ROWE

▼

LAST year the Petrolifera Italiana, producing crude oil in Italy and affiliated with the Standard Oil Company of New Jersey, made a profit of 6,000,000 paper lira, and paid a dividend of 10 percent. Profits for 1932 are estimated at 12,500,000 lira.

FINANCE

New York: August

DESPITE the lack of any important evidence of gains in basic industry the security markets forged ahead substantially during the past month, bringing stock market averages up about 100 percent from their bear market lows of June and approximately to the levels of last March. Sustained strength in the bond market has been very gratifying, since it must be recognized that the absurd appraisals of intrinsic value that had come to prevail in bond quotations would have to give place to saner valuations as one of the prerequisites of real business improvement. Definite business gains of at least seasonal proportions are confidently expected this month, and the belief seems to be growing that the restoration of confidence already achieved together with vigorous prosecution of the President's economic program will mark the definite turning of the tide toward recovery.

The oils continued their advance last month, and from all indications have been continuing in the third quarter the comparatively good earnings status revealed in the various second quarter reports that have come to hand. It is a very creditable achievement for the industry to have recovered from the serious losses of last year to present profitable circumstances, moderate though current earnings are, but it would quickly prove fatal should there be any relaxation of vigilance at the present juncture. Despite the effectiveness of curtailment measures and the improvement in prices and profits compared with those prevailing a year ago, stocks of all oils were increasing this year during the first five months whereas in the same period of last year they had been decreasing; and the sharp decrease in June of this year was in large part fictitious due to transfer of large quantities of gasoline from reported to unreported storage in preparation for the Federal gasoline tax which became effective on June 21. That there is more gasoline on hand than needed is clear and with demand for the year showing a decline from last year that may amount to 12 percent or more, it is obvious that only a wise control of these stocks in strong hands can prevent a breakdown of the price structure in the coming months when the force of seasonal decline in consumption will be felt. When the figures for July become available this month it will be possible to judge more accurately the extent of the decline in demand this year, since averaging of the figures for May, June and July will serve to eliminate the distortion in the June and July figures growing out of the imposition of the Federal tax. In the meantime, there is no question but that further restriction of refinery runs and crude output is highly desirable. Leaders in the industry are strongly urging this course of action and the recent weekly reports of the American Petroleum Institute indicate that some success in this direction is being achieved. It would indeed be an economic tragedy if the selfish blindness of a few operators were to nullify for the entire industry not only its own financial recovery but the prestige among industries earned by its sound leadership in showing the way out of a depression of unparalleled magnitude.

THE new management of Standard Oil Company (Kansas), which came into control in March of this year, has been commendably prompt in studying intensively the company's economic position in the industry and in formulating a program designed to extricate it from its indicated precarious and circumscribed position. In past years the company has operated almost entirely as a refiner and wholesaler, purchasing its crude supplies and selling practically its entire refinery output to one customer, which was the Standard Oil Company (Indiana). The spread between crude and gasoline prices has tended to narrow in recent years to the increasing detriment of the company's operations, and expansion toward the status of complete integration is surrounded by well-nigh insurmountable obstacles which would make the cost particularly prohibitive in the distribution department. Some expansion in the way of pipeline and production facilities has been accomplished, but it appeared that more drastic steps would be advisable.

The plan worked out by the management, which is being submitted to stockholders at a special meeting at the offices of the Company on September 26, involves sale of the refinery and pipe line facilities and oil inventories to Standard Oil of Indiana. The latter's offer of $3,430,000 in cash is approximately the value of these assets as established by a recent

New York Stock Prices

1932 High	1932 Low	Current Div. $ per Annum	Stock (Par Value $)	July 25 to August 20 Sales (Shares)	First	High	Low	Last	Net Change[1]
19¾	8⅝	1.00	Atlantic Refining (25)	331,300	14⅞	19¾	14¾	17½	+2½
6¾	3⅜	....	Barnsdall 'A' (25)	247,900	4⅞	6¾	4⅞	6	+1
1⅛	¼	....	Colon Oil (No)	7,400	¾	1⅛	¾	1	+ ½
9	4	....	Consol Oil (No)	543,600	6¼	9	6¼	8	+1⅞
7⅝	3⅝	....	Continental Oil (No)	285,000	5¾	7⅝	5⅝	7	+1½
3⅛	1¾	....	Creole Petroleum (No)	19,100	2⅜	3⅛	2½	3⅛	+ ⅜
41	23	....	Gulf Oil Corp. (25)	49,400	32¼	41	31½	38	+6½
51½	35⅝	2.00	Humble Oil & Ref. (25)	5,400	44⅝	51½	44½	48	+6¼
10	6¼	0.50	Imperial Oil, Ltd. (No)	28,800	8	10	7¾	9	+1
1⅝	1	....	Indian Refining (10)	1,500	1½	1⅝	1⅜	1⅝	+ ¼
11⅜	8	1.00	International Petr. (No)	35,200	9¾	11⅜	9⅝	10½	+ ¾
11	5	0.80	Ohio Oil (No)	204,900	8⅝	11	8⅛	9½	+1
12½	7¼	1.00	*Pan Amer. P. & T. 'B' (50)	8,700	9½	12½	9	11½	+1⅝
7⅞	2	....	Phillips Petr. (No)	217,100	4⅞	7⅞	4⅞	6⅞	+2
6¼	2⅞	....	Pure Oil (25)	76,300	4¼	6¼	4¼	5¼	+1⅛
1⅜	¼	....	Richfield Oil (No)	32,900	⅝	1⅜	⅝	¾	+ ¼
23	12⅛	†0.81	Royal Dutch N. Y. (13⅓)	29,700	17½	22	17¼	20⅜	+2⅝
15⅝	6⅝	0.40	Seaboard Oil (No)	439,200	9	15⅝	8⅝	14¼	+5½
7⅛	2½	....	Shell Union (No)	144,800	4⅞	7⅛	4½	6½	+1⅞
5	2½	....	Skelly Oil (25)	13,300	3⅝	5	3⅝	4½	+1
11⅞	5¼	0.80	Socony-Vacuum (25)	290,400	10	11⅞	9¾	10¼	+ ⅜
28⅞	15½	2.00	Standard Oil of Calif. (No)	249,800	23¼	28⅞	23¼	26⅞	+3¾
24¼	13½	1.00	Standard Oil, Ind. (25)	141,900	20½	24¼	20½	24½	+3¾
16½	7	....	Standard Oil, Kansas (25)	20,800	11⅜	16½	11⅛	16⅜	+4⅞
15⅞	8⅞	1.20	Standard Oil, Ky. (10)	25,000	11¾	14¼	11¾	12⅝	+1
36¾	19⅞	§2.00	Standard Oil, N. J. (25)	604,200	28⅜	36¾	27¾	33⅝	+5½
33¼	24¾	1.00	Sun Oil (No)	3,900	30	33¼	30	33	+3⅞
17⅜	9¼	1.00	Texas Corp. (25)	258,500	12⅝	17⅜	12⅝	15¾	+3¼
5¼	2	....	Tide Water Assoc. (No)	153,400	3	5¼	3	4¾	+1¾
13⅞	8	1.00	Union Oil of Calif. (25)	58,800	10⅜	13⅝	10⅜	12⅜	+2⅛
½	⅛	....	Venezuelan Petr. (5)	10,400	¼	⅜	¼	⅜	+ ⅛

[1]Since close of last month's table. †Paid for 1931—no regular rate. §Including extras. *Ex Pan American Foreign.

appraisal of independent auditors. If the plan is carried out the company will have cash assets, after allowing for all debts, equal to over $17.50 per share, and will retain its producing properties in the Mid-Continent which are now showing net earnings under proration at an annual rate of more than $300,000. The management is proposing to use the cash assets in extending operations in the crude oil branch of the industry, in which field the directors believe lie some of the best possibilities for future profit.

At the meeting on September 26 stockholders will also be asked to approve reincorporation of the company in the state of Delaware under the title Standard Oil Company of Kansas, and reduction in the par value of the capital stock from $25 to $10 a share. The latter change will result in elimination of the deficit in the surplus account arising through writing down of certain fixed assets to values determined in accordance with the recent independent appraisal of the properties. A deficit of $2,158,571 would thus be converted into a surplus of $2,730,000.

STANDARD Oil Company (New Jersey) has extended to September 30 its offer to acquire minority shares of Pan American Foreign Corporation. The terms of this offer were described in our financial notes of last month.

THE testimony of returning earning power in the industry this year has been uniformly presented in the reports of second quarter and half-yearly income statements released during the past month. Standard of California earned $3,986,302, or 30 cents a share, in the second quarter, compared with $2,930,241, or 22 cents a share, in the first quarter, and with $1,275,358, or 10 cents a share, in the second quarter of 1931. Shell Union cut its loss to $193,126 in the second quarter, compared with a loss of $2,742,-300 in the first quarter and loss of $11,-056,034 in the second quarter of last year. Consolidated Oil earned a profit of $1,236,-050, or 5 cents a share, in the first five months of this year and it is understood that June and July showed net of about $1,000,000 each; no comparison with the same period of last year is available but it is significant that Sinclair and the two Prairie companies, which merged to form Consolidated, showed combined 1931 deficits of about $40,000,000. Tide Water Associated reported second quarter net of $1,572,097, compared with net of $527,603 in the preceding quarter and net loss of $885,889 in the June quarter of 1931. Continental Oil's second quarter net of $1,616,346, or 34 cents a share, compares with a first quarter net loss of $1,872,848 and loss of $4,037,698 for the second quarter of last year. Seaboard Oil earned $191,471 in the June quarter, compared with $180,339 in the March quarter and a loss of $34,917 in the June quarter of last year. Ohio Oil declared another 20-cent dividend, the second this year following a lapse of payments for a year, and reported second quarter profit of $2,442,092, equal to 24 cents a share on the common, compared with $1,656,106, or 12 cents per share of common, in the first quarter; comparative figures for the second quarter of 1931 are not available, but for the entire year 1931 a net loss of $5,182,260 was reported. Many other companies have shown similar improvement in earnings position, including Skelly, Mid-Continent, Simms, Rio Grande and Amerada.

ALMOST the only discordant note that has been injected into Oil Symphony of Progress during the past month has been the reduction in the dividend of Standard Oil of Ohio from $2.50 per annum to $1.50. This was the first change in the rate since 1923 and came as a complete surprise to the financial community. The formal statement accompanying the announcement was as follows:

> The directors do not feel that in view of current conditions a total dividend for 1932 in excess of $2 a share on the common stock is warranted. A dividend of $1.25 a share having already been paid in the first half of the year, the dividend for the third quarter has, therefore, been reduced to 37½ cents, it being expected that except for an unforeseen change in conditions a similar payment can be made on January 1, 1933.

The generally accepted explanation for this action seems to be the highly competitive conditions to be found in the Ohio marketing territory, where there has been bidding for gallonage at the expense of the price level. Standard of Ohio reported strong financial position as of the close of last year.

IT IS reported that attorneys for the Richfield Oil bondholders' protective committees have been and are in New York endeavoring to work out details of the proposed sale of properties to Consolidated Oil. This plan was commented upon in these advices last month. It is understood that Cities Service is still opposed to the Consolidated offer and will later announce a plan of its own. Consolidated has also offered to acquire Rio Grande Oil on the basis of two shares of Consolidated for each five shares of Rio Grande. Directors of Rio Grande have approved the plan and have recommended ratification by stockholders at a special meeting on September 14 to be held at El Paso, Texas. Some minority interests are opposing the sale, but it is questioned that they can control sufficient stock to block the deal.

C. C. BAILEY

▼

Paris: August

THE persistent improvement of prices and conditions on the Paris oil share market during recent weeks is mainly a reaction to the better tone displayed on the stock exchange in London and in New York.

A more cheerful atmosphere has been created by the announcement that some of the major American oil companies are to distribute quarterly or half yearly dividends, with the result that since last month there has been a further rise in the price of shares which in the case of the Royal Dutch ordinary share works out at 239 points. The Société Générale des Huiles de Pétrole comes next on the list with 87 points, Petrofina with 51 points and the Compagnie Industrielle des Pétroles with 40 points; the smaller companies have all followed suit in a greater or lesser degree.

In the distributing field great changes have also come about. As we pointed out in the August issue of WORLD PETROLEUM large and small French importers of petroleum products had at last arrived at an agreement which enabled them at the time to increase the price of gasoline by Fr. 10.– an hectoliter. Since that date there have been two further rises in price making a total of Fr. 25.– per hectoliter.

These reforms are mainly due to the determination and energy of General Serrigny, the new President of the Chambre Syndicale des Pétroles. He only took over the post four or five months ago after having retired from active service in the army, but Serrigny is a man of no mean repute and he is also an economist. It did not take him long to grasp the situation, nor to realize that price wars must cease unless the oil industry in France was to succumb. He, therefore, set himself the task of righting wrong and has tackled the problem with such success that all those concerned may now look forward to a brighter future and the hope of obtaining a small margin of profit upon their sales.

The present agreement has been signed for a period of six years and works on the basis of a pro-rata reduction of the quantities allotted to each company or group for importation by the State in the triennial licences.

AS A result of the reverses met with by the Société Française de Recherches au Venezuela during 1930 and 1931 and mentioned in the July issue of WORLD PETROLEUM, it has been decided to liquidate

the company and to sell to the Compagnie Pétrolière Française de Caracas whatever assets may remain after the said liquidation. A meeting of shareholders has been called to this effect on August 23 when explanations will doubtless be given to shareholders.

THE improved position and better returns obtained by some of the American oil companies latterly has come as a filip to certain holding companies in France. Franco Wyoming appears to have reacted rapidly and the directors of the company have issued a statement declaring that the position is now no longer as serious as it was during the beginning of the year.

PÉTROLES France-Mexique announces losses for 1931 amounting to Fr. 649,092 which together with those of 1928, 1929 and 1930 brings the total up to Fr. 9,863,742 on a capital of thirteen million francs.

The company was only founded in 1926 under the auspices of the ill fated S.A. Dabrowa and holds concessions in different parts of Mexico where the Compania Petrolera Francia-Mexico has undertaken drilling operations on its behalf.

When founded, France Mexique held large numbers of Dabrowa shares which are now worthless; its own shares have not been quoted on the Paris Bourse for a period of over two years and the situation as time goes by is becoming more and more critical. Like the directors of the Compagnie Française de Recherches au Venezuela, the Directors of France Mexique will doubtless find they are obliged to liquidate unless more capital can be raised to save the company from its obvious fate. This at the present time is more than doubtful, and in any case might be considered throwing good money after bad. The French are becoming more and more sceptical as to the advisability of investing their money in this kind of concern for every experience has turned out a negative one.

E. J. ANDRÉ

▼

London: July

QUOTATIONS for oil shares have advanced rapidly during the past month, and the market has now attracted a considerable public following. Several minor reactions have taken place, but these have certainly not been more than is generally necessary to keep the market in a healthy state. That they have not been more pronounced is doubtless due to the fact that the rise started with practically no speculation on the long side, the first advance being due to covering by bears on the relative success of the Paris Conference. Many shares have reached new high levels for the current year, and the demand for low priced issues has continued, some of the latter having approximately doubled their prices during a few weeks. Apart from the hope that the Paris agreement, when ratified, will achieve something useful for the industry, operators are basing purchases on the belief that Russian oil interests will eventually come to a marketing arrangement with other world producers. The rise in New York quotations has, of course, assisted the market here to some extent, and even more attention has been paid to the evidence provided by leading companies in the United States that operating conditions this year are appreciably more profitable than for corresponding periods of 1931. Many of the recent purchases of shares have been taken off the market altogether, and this maintained a thoroughly sound technical position up to a point. With prices rising, and public interest increasing, the beginning of a "bull" account now appears to have been built up, and the resisting power of the market has been correspondingly reduced.

Rising prices for oil shares are attributable to two sets of influences at the present time. One is the improvement in a wide range of industrial equity shares, and the other concerns the changing outlook for internal conditions in the petroleum industry. In so far as the general rise in industrials is justified, higher prices for oils are also reasonable, since petroleum consuming industries will certainly be among the first to develop rapidly when world conditions take a definite turn for the better. Conditions in the industry itself present a more complex problem. In the United States there are evidently signs of more profitable working, but the decline in consumption there is regarded as a possibly serious offsetting factor. While the outlook for the world industry has been definitely improved by the possibility of an international marketing agreement, the fact remains that a generally higher level of prices could only be established through restriction of sales. The question is whether under such conditions of curtailment, British oil concerns could earn profits in the immediate future commensurate with capital expenditure to date and current share values. The more conservative market men, therefore, while admitting a definite improvement in prospects, believe that this has been largely discounted by the recent rise in quotations. Further constructive news is considered necessary before any further improvement in share prices could be justified on the near outlook. Perhaps the best reason for a further advance would be the soundness of the leading British concerns, and their power to withstand recent depression.

IF THE market had been in a less exuberant mood, the annual report of the Mexican Eagle Company would have caused some disturbance. The principal feature of the report was the decision to withhold payment of the first preference dividend pending the outcome of a lawsuit which the company is defending, arising out of alleged defective land titles to property in Amatlan. Although confident of the outcome of the case, the directors, in addition to stopping dividends, are suspending all avoidable capital expenditure. In any case, no div-

Paris Bourse Prices

1931 Div.	1931 Par.	Share	July 13 to August 11 First	High	Low	Last	Change	Position on August 11, 1931
30 Lei	500 Lei	Astra Romana	53	64	53	58	+ 5	80
....	500 Lei	Colombia	59	64	59	62	+ 3	68
50 Lei	500 Lei	Concordia	45	47	44	45	..	54
....	500 Fr.	Franco Pol. Petroles act.	43	58	43	..	..	56
....	....	Franco Pol. des Petroles part.	152	183	152	183	+ 31	233
1 $	10 $	Franco Wyoming	197	286	197	284	+ 87	298
20 Fr.	500 Fr.	S. G. Huiles de Petrole act.	50	59	50	59	+ 9	93
....	....	S. G. Huiles de Petrole part.	410	410	400	400	— 10	..
....	500 Fr.	C. Francaise des Petroles	410	450	406	450	+ 50	805
....	500 Fr.	C. Industrielle des Petroles	621	651	589	651	+ 30	806
70 Fr.	500 Fr.	Lille Bonnieres Colombes prio.	..	380	335	380	..	512
45 Fr.	500 Fr.	Lille Bonnieres Colombes ord.	35	40	33	40	+ 5	47
....	....	Mexican Eagle	66	80	66	73	+ 7	101
....	250 Fr.	Omnium Intert. des Petroles.	319	330	310	330	+ 11	600
50 Fr.	500 Fr.	Pechelbronn	364	415	353	415	+ 51	455
60 Fr. B.	500 Fr. B.	Petrofina	13.100	15.400	13.100	15.400	+2.300	20.200
240 Fl.	1000 Fl.	Royal Dutch	1.310	1.549	1.310	1.549	+ 239	2.060
24 Fl.	100 Fl.	Royal Dutch 1 10	173	205	173	205	+ 32	285
....	1 £	Shell	219	229	209	229	+ 10	209

London Stock Exchange Prices

1932 High	1932 Low	Last Year's Div. % per Ann.	Share	July 15 – August 15 First	High	Low	Last	Change
9/16	9/32	....	Anglo-Ecuadorian	5/16	9/16	5/16	9/16	+1/4
1 7/16	31/32	10	Anglo-Egyptian "B"	1 3/16	1 7/16	1 1/8	1 7/16	+1/4
2 5/32	1 3/16	5	Anglo-Persian	1 23/32	2 5/32	1 21/32	2 5/32	+7/16
3/4	15/32	20	Apex Trinidad (5s.)	17/32	3/4	17/32	3/4	+7/32
1/4	3/8	....	Attock	7/16	17/32	13/32	17/32	+3/32
7/16	3/16	5	Brit. Borneo (6s.)	11/32	7/16	11/32	7/16	+3/32
3/16	1/8	5 1/4*	Brit. Burmah (8s.)	3/16	3/16	1/8	3/16	....
3/32	1/16	....	Brit. Controlled ($5)	1/16	3/32	1/16	3/32	+1/32
3/32	1/16	....	Brit. Controlled Pfd. ($5)	3/32	3/32	3/32	3/32	+1/16
3	1 13/16	17 1/2	Burmah	2 1/32	3	2 1/4	3	+2 1/32
13/32	7/32	....	Canadian Eagle (No par)	1/4	5/16	1/4	5/16	+1/16
7/8	1/2	....	Creole (No par)	9/16	7/8	9/16	7/8	+5/16
1/8	1/16	....	Kern River (10s.)	1/16	3/32	1/16	3/32	+1/32
1 7/8	31/32	12 1/2	Lobitos	1 1/16	1 7/8	1 9/32	1 7/8	+9/16
13/32	1/4	....	Mexican Eagle ($4 Mex.)	9/32	11/32	1/4	11/32	+1/16
16	4 1/2	....	Pan American "B" ($5)	8 3/4	16	8	15	+6 1/4
7/16	3/32	....	Phoenix	7/32	7/16	7/32	13/32	+3/16
20 1/8	10 1/4	6	Royal Dutch (fl. 100)	14 3/4	18	14 1/4	18	+3 1/4
2 1/2	1 7/16	17 1/2*	Shell Transport	1 7/8	2 5/16	1 13/16	2 5/16	+7/16
13/32	3/16	4	Steaua Romana	9/32	13/32†	9/32	13/32†	+1/8
1 5/8	1 1/8	5	Trinidad Leasehold	1 3/8	1 5/8	1 11/32	1 19/32	+7/32
3/16	3/32	....	Untd. Brit. of Trinidad (6s. 8d.)	3/32	3/16	3/32	3/16	+3/32
1 17/32	7/8	10	Venezuelan Oil Concessions	1 3/16	1 17/32	1 5/32	1 17/32	+1 1/32

Nominal value of shares £1 unless otherwise stated by bracketed figures.
* Denotes Tax-free dividend. † Denotes "Ex-dividend" price.

idends were earned in 1931, provision of the increased amount of $11,358,345 for depreciation leaving the company with a loss of $1,301,121 against a net profit of $4,818,114. Among the favorable factors brought out in the report are the stability and soundness of the present Mexican Government, the achievement of many economies by the company, and the anticipation that full benefit from the latter will be reaped during the current financial period.

LIKE the Mexican Company, Canadian Eagle Oil made an operating loss last year, but this was more than offset by income from investments, which include a large holding of British Government securities. The result was a net profit of $1,228,595, compared with $6,929,905 in 1930, which would in normal circumstances have enabled the company to pay its first preference dividend. When the Canadian company was formed in 1928, however, to acquire Mexican Eagle assets outside Mexico, the two companies arranged a mutual guarantee of their first preference dividends! No decision will therefore be made as to the payment of a first preference dividend until the Mexican company has obtained a decision in its lawsuit. In conjunction with the Asiatic Petroleum Company, another leading Royal Dutch-Shell Group subsidiary, Canadian Eagle purchases the production of Venezuelan Oil Concessions under contract. Restriction in Venezuela is reflected in a substantial decline in oil purchased, which reduced the company's operating revenue.

REPORTS of three old time Russian oil concerns, issued within recent weeks, are of interest in view of recent oil negotiations with Soviet interests. The companies are the New Schibaieff, Ural Caspian, and North Caucasian, the first two of which are affiliates of the Royal Dutch-Shell Group. Each of the companies refers to abortive negotiations regarding debts between the British and Russian Governments, and holds out little hope of an early settlement of claims on account of confiscated properties. The companies have all applied for their shares of the funds set aside by certain buyers of Russian oil for the benefit of former owners of Russian oil properties. No early distribution from these funds is possible, and in any case the sums received would not be sufficient to enable the companies to make any payment to their shareholders.

ALEC H. DAY

▼

Roumanian Agreement Expected

(Continued from page 380)

the pressure thus created may prove embarrassing to control of exports and advocates, therefore, immediate imposition of a restriction of production scheme. Roumania's experience in attempting to restrict production has been unfortunate in the past, but under present conditions such efforts may be expected to meet with more success.

The third and perhaps most complex problem is the reorganization of the domestic market, which, while not directly interesting the international oil companies which participated in the Paris and New York conferences, may be necessary before the Roumanian industry is in a position to commit itself to controlled exportation of surplus petroleum. Reorganizing the internal market will be mostly a matter of repartitioning quotas therein and this work may be taken up on the basis of export quotas and restriction of production.

The most obvious difficulty that must be overcome in stabilizing production in Roumania is due to the considerable increase in production. Daily production now amounts to approximately 161,000 bbl. and average production for the year to date is 126,000 bbl. per day. Roumania's export quota for the European markets is expected to be fixed at about 112,000 bbl. to which must be added domestic requirements and from which must be deducted some 15 percent to allow for decrease in consumption in European markets supplied by Roumania. This will leave, at present rate of production, a very sizeable surplus which, if left undisturbed, will doubtless succeed in demoralizing the domestic market to an extent that would destroy most of the benefits of the export agreement. Faced with these facts the Roumanian producers feel that it is essential to develop a plan for cutting down production before the export agreement becomes effective.

Increased production in Roumania has been largely due to the rapid development of Gura-Ocniței-Răsvad, successfully explored by Sondrum. Drilling activity in this region, which has already resulted in a 4,200 bbl. per day well belonging to Steaua-Romana, is being continued actively and several new wells are expected to come into production shortly. Creditul-Minier has brought in a production of 14,000 bbl. daily from a first Meotic Sand well which is flowing freely.

All this activity appears to be making the problems confronting the Roumanian oil industry more serious and a solution of the difficulties more remote but an examination of such facts as those brought

out by Otto Stern, general manager, Astra-Română, and member of the delegation to the Paris conference, put the whole matter in a more hopeful light. Mr. Stern called the attention of the general meeting of the industrialists to the fact that Astra-Română and Româno-Africana, representing international oil companies interested in the successful conclusion of a world agreement, at present purchased over 45 percent of Roumanian oil for export. In the event that an agreement was not concluded the companies in question would be at liberty to avoid the chaos of the Roumanian market by refusing to purchase Roumanian oil for export. The results of such a policy affecting half of all Roumanian oil exports would be disastrous to the industry in this country and will doubtless be avoided at all costs.

In view of the enthusiastic reception of the Paris agreement by the Roumanian producers and the absolute necessity for some such agreement, it is confidently expected in oil circles here that a favorable reply will be forwarded on or before the fifteenth of September to the other representatives who joined the Paris conference.

▼

Ropeway Carriers

(Continued from page 372)

The towers are of steel construction erected on concrete foundations, and the power for the ropeway is supplied by petrol-driven engines.

With the blondin type of ropeway the load can be raised, propelled across the ropeway and then lowered, facilitating easy loading and allowing motor vehicles or lorries up to the capacity of the ropeway to be run directly onto the carrier and directly off again on reaching the discharge end. The spans between the towers are, in the case of the Euphrates, 1830 ft. and of the Tigris, 1985 ft.

As native craft navigate both rivers to some extent, sufficient elevation above the river must be provided to clear the masts and booms of the river craft. In the hot months of the summer the sag in the wires is something like 80 ft. below their points of suspension over the towers. Consequently the towers are of considerable height; in the case of the Tigris 140 ft. and of the Euphrates 130 ft. The bases of the towers are well clear of flood water and range from 38 ft. to 7 ft. above the highest recorded flood.

On the Euphrates the difference between high and low water level is approximately 12 ft. and in the case of the Tigris 23 ft.

For the Tigris river a blondin has been provided to take a maximum load of 3½ tons, with a lifting speed of 120 ft. per minute, and a traveling speed of 480 ft. per minute, the power being supplied by a 38 b.h.p. 4-cylinder engine working at 1000 r.p.m. The main cables are 5¾ in. in circumference while the traveling ropes are 2¼ in. and the hoisting ropes are 1¼ in.

For the Euphrates river the maximum load at top speed is 5 tons with a lifting speed of 240 ft. per minute and a traveling speed of 960 ft. per minute. It has been so designed that where required a maximum lift of 10 tons can be made but in this case only at half the speed, the power being supplied by a 100 b.h.p. 6-cylinder engine at 1000 r.p.m. The main ropes in this case are 6¾ in. in circumference while the traveling ropes are 3 in. and the hoisting ropes are 1¾ in.

The carriers that will be used for taking the actual loads, will be of three different types, namely:

(a) A sling platform to take case goods, touring cars and small lorries.

(b) A set of slings for transporting pipe.

(c) A form of sling of fairly heavy wire rope construction, so arranged as to fit under the wheels of the larger lorries for transporting these across. These lorries will be carried across empty as their total loaded weight would exceed the allowable capacity.

▼

Jersey's Hydrogenation Plant

(Continued from page 384)

invention of much new equipment. The oxygen recorder-alarm device mentioned above is one of the instruments developed especially for the hydrogenation process. The hydrogenating pressure of 3,600 lb. per sq. in. is so much higher than that normally maintaining in refining processes that the customary types of flow, pressure, and temperature indicating and recording instruments were unsuitable. It was necessary to work out an entirely new type of measuring and control equipment, which would withstand the rigors under which the process is operated.

These are but a few of the difficulties that have beset scientists in their efforts to adapt the process to commercial performance. The number of problems, both engineering and economic, which intensive study and painstaking research have finally shown capable of practical solution is a striking tribute to the men and methods employed. While even the most enthusiastic proponents of the hydrogenation process frankly admit that there are many obstacles yet to be surmounted, the progress already made is certainly commendable. What seems equally commendable to this writer is the fine spirit displayed by the sponsors of the process in their willingness to make it generally available to the industry, whenever the need for its widespread use becomes apparent, and their intelligent and progressive attitude in keeping the industry and the public informed on the progress that is being made.

▼

Spanish Monopoly

(Continued from page 388)

a small group, and protected by every form of tax exemption, freedom from price control and special concessions.

In December, 1931, the Minister of Finance presented a plan for the reorganization of the monopoly, the whole affair to pass under government control, with a government majority on the Board of Supervisors and a representative of the nation as president. In other words, the present monopoly was repudiated. The bankers now in control have been carrying on a bitter fight against the new plan, and they declare that rather than accept it they would prefer to see the former free market reëstablished.

It must not be supposed that the people have passively suffered under the monopoly without protest. Feeling has been bitter, but with the press censorship and a dictatorship it has been hazardous, if not impossible, to criticise any act of the government in power.

▼

A DISCOUNT system for purchasers of large quantities of gasoline has been announced by Standard Oil Company of Indiana by which purchasers of 100 gallons a month or more from company owned or operated stations will receive at the end of the month refunds amounting to two cents a gallon for standard and premium brands and one cent a gallon for third grade. Indiana Standard officials maintain that their changed marketing policy has been adopted to meet practices that have been used secretly by competitors for some time.

International News and Reports

DURING the second quarter of 1932 no further shipments of Russian oil into China have been reported.

▼

Petroleum exports from Columbia for the first half of 1932 amounted to 8,998,-974 bbl. against 8,965,906 bbl. exported during the corresponding period of 1931.

▼

Russia has purchased $14,000,000 worth of oil field and refinery equipment in the United States in the period from 1928 to 1931, reports the U. S. Department of Commerce.

▼

Another international oil conference is expected to be held in Amsterdam or London in October next by leaders of the petroleum industry. The Soviets may be invited to attend.

▼

Extension of compulsory adulteration of motor fuel to Czechoslovakia took place on September 1 when a law requiring not less than 20 percent alcohol by volume be added to motor fuel became effective.

▼

Rumors are current that an oil refinery may be erected in South Africa by an important British oil company, and that part of the plant will handle local shale with a view to inducing the Government to grant a bounty of about 5s/0d on the pound sterling on sales. It is doubtful, however, if either of the major international oil companies are considering such a project.

▼

Bulk petrol tanks with a capacity of over 3,000,000 Imperial gallons are to be erected in four cities of New Zealand for the Associated Motorists' Petrol Company, Ltd., an organization formed to supply petrol to members at a substantial saving over prices prevailing in New Zealand. Tenders have already been let and the storage will be constructed at Auckland, Wellington, Christchurch, and Dunedin. Associated Motorists have also secured an exclusive monoply to import and distribute Soviet petroleum products for three years. Formerly all New Zealand supplies came from Netherlands Indies and the United States.

▼

According to promotion plans, the British-Canadian Oil Fields, Ltd., will develop extensive oil concessions in Colombia, Venezuela and Guatemala. It is said that the company will absorb the All-American Corporation. Authorized capital is 7,500,000 shares of $5. par value.

▼

Within three months a complete absorption and stabilization plant for the manufacture of gasoline will be delivered by the Montreal Locomotive Works to the Shell Oil Company of Canada, Ltd. The plant, which is being constructed with the assistance of Alco Products, Inc., acting in an advisory capacity, will be installed in the Shell Company's refinery at Montreal.

▼

Addition of from one to three thousandths of one percent of parabenzylamino-phenol to cracked gasoline in storage will keep the motor fuel fresh and unchanged preventing oxidation with resulting gum formation and loss of antiknock quality, assert Drs. T. H. Rogers and Vanderveer Voorhees of the Standard Oil Company of Indiana. After extensive chemical research work including various tests of gasoline in storage Rogers and Voorhees announced in a paper presented to the American Chemical Society that this compound had proved most satisfactory of any of the chemical compounds proposed for this purpose.

▼

Powering a 1500-Mile Pipeline

AN EXCEPTIONAL record in pipeline equipment is described in the 32-page advertising insert of the Winton Engine Corporation of Cleveland, Ohio, U. S. A. included in this issue, which deals in an interesting and informative manner with the recent construction of the 1500-mile Great Lakes Pipeline.

Altogether there are 23 pumping stations on the line. For all units and all the stations Winton 4-cycle Diesel engines were used—a total of 37 units varying from 120 b.h.p. to 330 b.h.p. This is one of the very few cases where a single make of American Diesel engine has been selected for the complete powering of an important pipeline.

One interesting feature in connection with the transportation of these engines to the pump station sites along the pipeline route was that the Diesel units were trucked fully assembled, except fly wheels, from the railroad cars to the pump station sites over the roughest kind of ground. This effected a considerable saving by avoiding the cost of re-erection and expedited the placing of the engines in operation.

The Winton is one of the best known American Diesel engines, and is used in large numbers by various departments of the United States Government. The company is a division of General Motors Corporation.

▼

Electric Mud Pump Motor

USE of electrical equipment in the production of oil is growing in importance with the development of every new field and equipment entirely suitable for every variety of conditions is now available. One of the most recent problems overcome is the difficulty of using an electric motor for driving mud pumps. The necessary stalling characteristic present in steam driven mud pumps has now been incorporated in an electric motor manufactured by Metropolitan-Vickers, makers of all types of electrical equipment for field and refinery. The new motor by use of the stalling characteristic does away with relief valves and may be direct coupled and mounted on the bedplate of the pump.

A similar motor has been developed for use in refineries. Self-governing in speed, it is used for presses and filters.

▼

Indiana Standard Buys Kansas Units

A JOINT announcement by E. G. Seubert and C. B. Wrightsman, presidents of Standard of Indiana and Standard of Kansas, confirms the rumors that the former company has purchased the refinery belonging to the latter company and situated at Neodesha, Kansas. In addition to the refinery which has recently been modernized and has a capacity of 20,000 bbl. per day, the deal included sale of Standard of Kansas' pipeline system in the vicinity of Neodesha.

Standard of Indiana has purchased the entire output of the Neodesha refinery for a number of years to supply its Kansas markets. Under the present arrangement it seems likely that the Kansas company will continue to supply crude to the refinery which will be operated by the Indiana company.

GREAT LAKES PIPE LINE

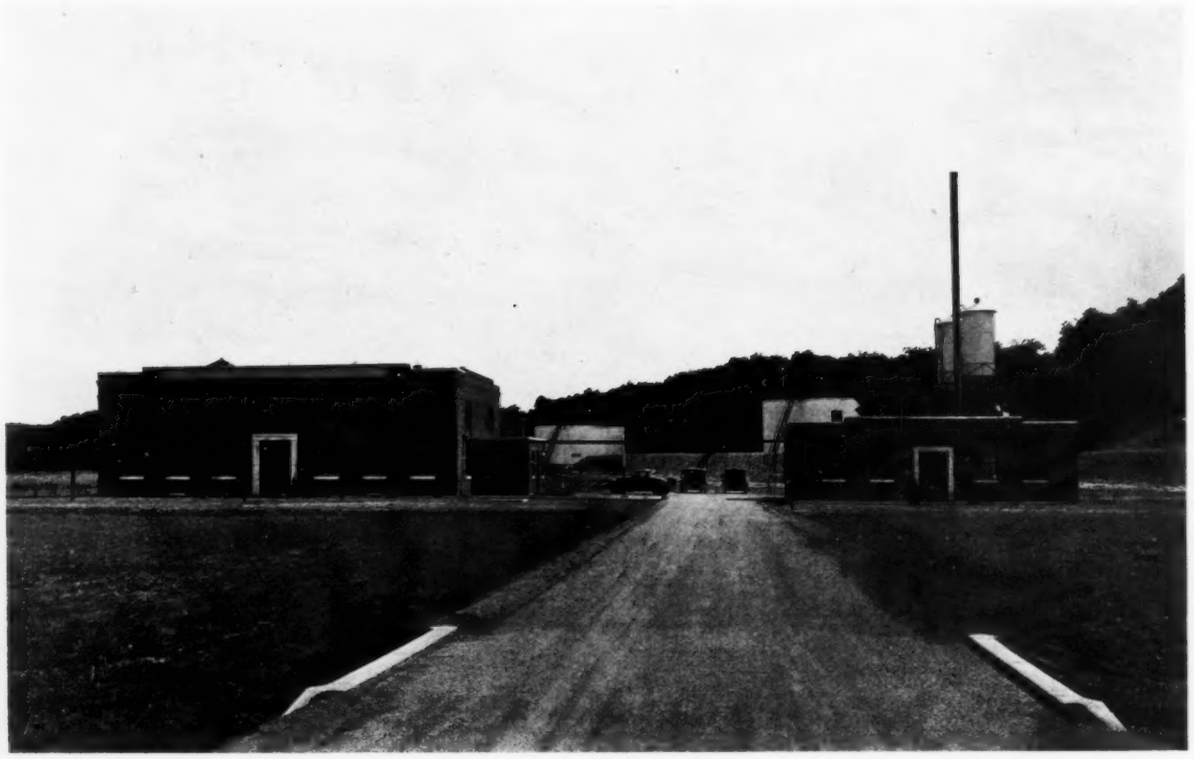
THE Great Lakes Pipe Line, briefly described in the following pages, is owned and operated by the Great Lakes Pipe Line Company, Kansas City, Missouri. With more than 1500 miles of pipe line in service, this is the first extensive line built for transporting gasoline exclusively. In its engineering refinements, completeness, and unusual operating record, the enterprise is an outstanding accomplishment.

WINTON ENGINE CORPORATION

2160 WEST 106th STREET

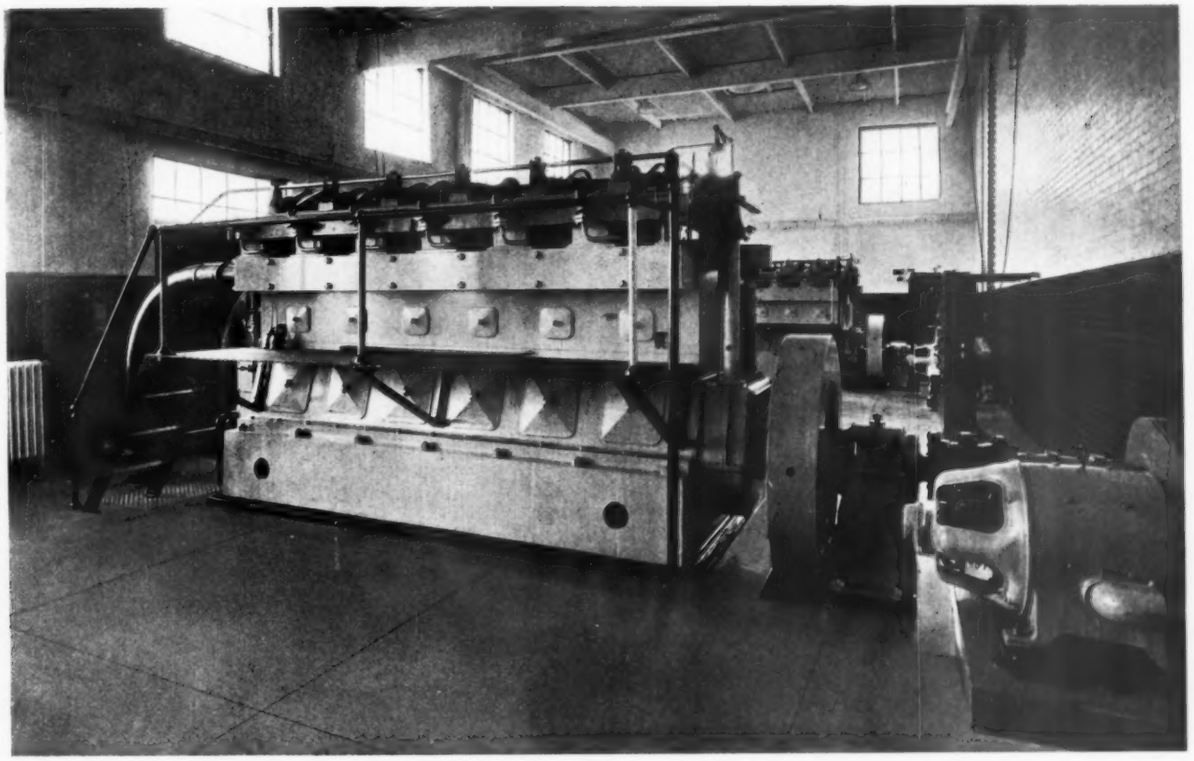
CLEVELAND, OHIO, U.S.A.

GREAT LAKES PIPE LINE



Station Buildings

GREAT LAKES PIPE LINE COMPANY, a Delaware Corporation, was organized in July 1930 by the Continental Oil Company, Barnsdall Corporation, Mid-Continent Petroleum Company, Skelly Oil Company, The Pure Oil Company, and Phillips Petroleum Company.



Eight-Inch Line Engine Room

The present officers of the Company are as follows:

E. B. Reeser, Chairman of the Board

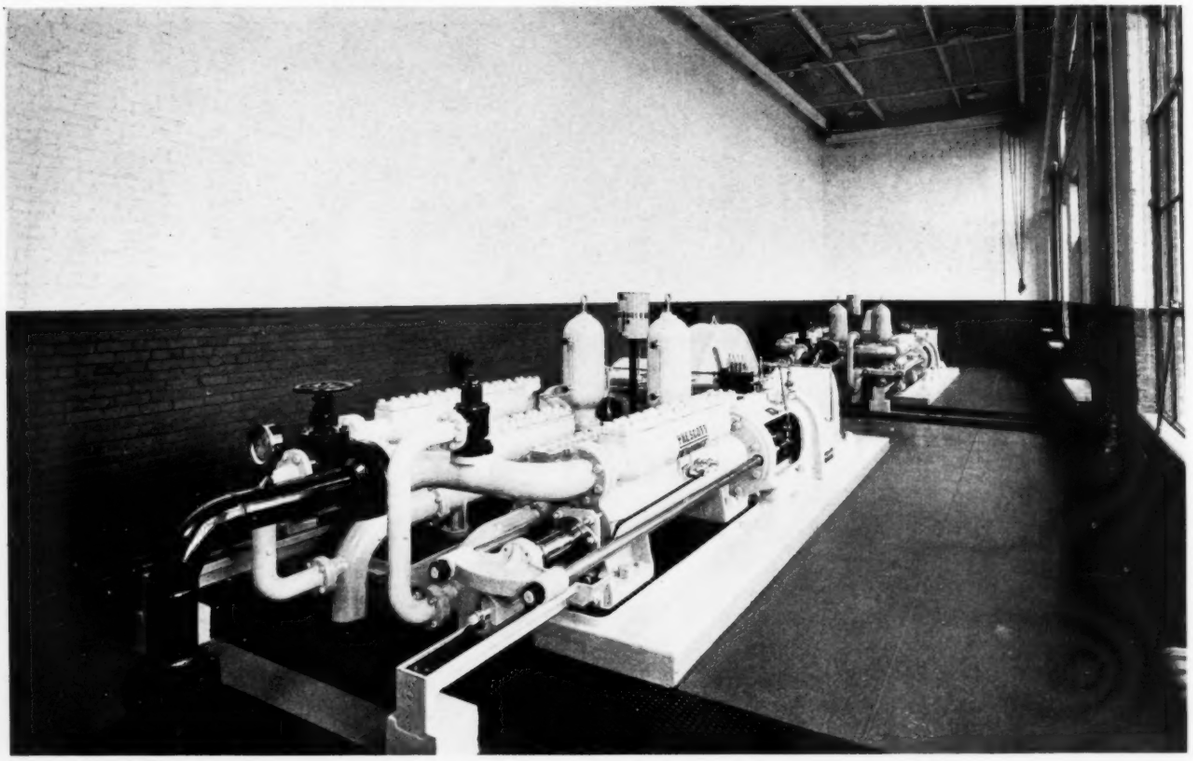
D. J. Moran, President

Harry Moreland, Vice President and General Manager

James J. Cosgrove, Vice President and General Counsel

P. A. Ward, Secretary and Treasurer

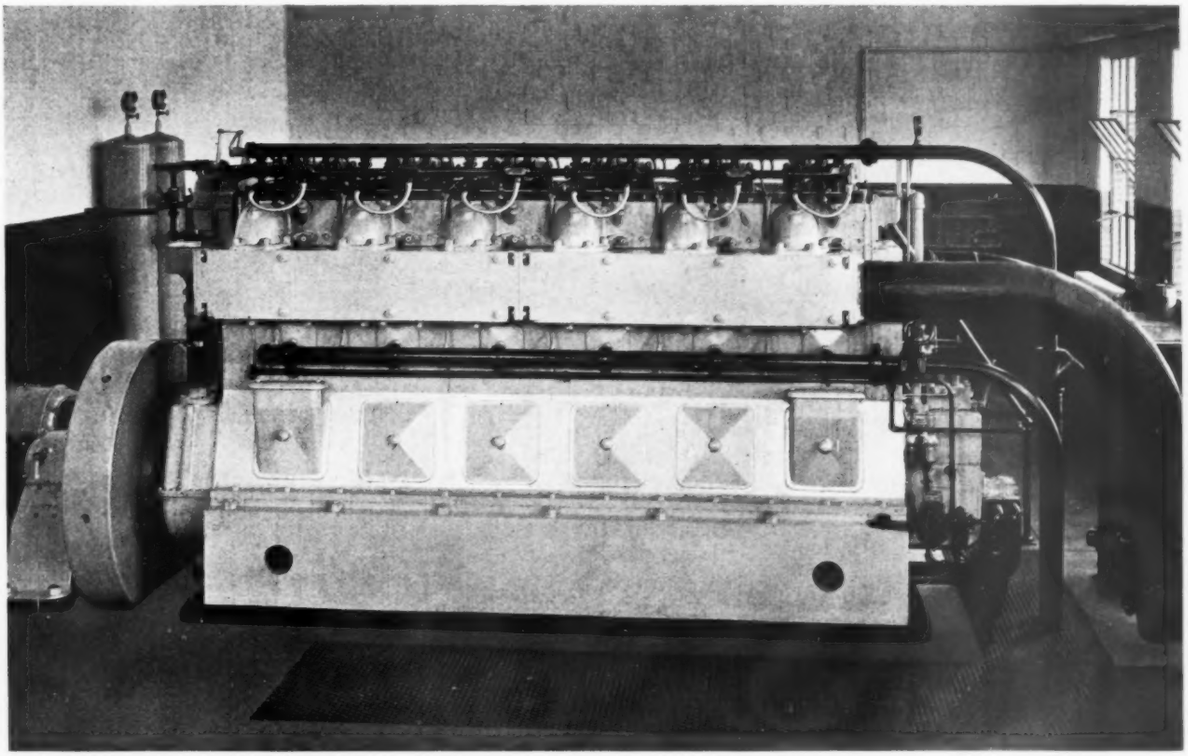
F. E. Richardson, Chief Engineer and General Superintendent.



Six-Inch Line Pump Room

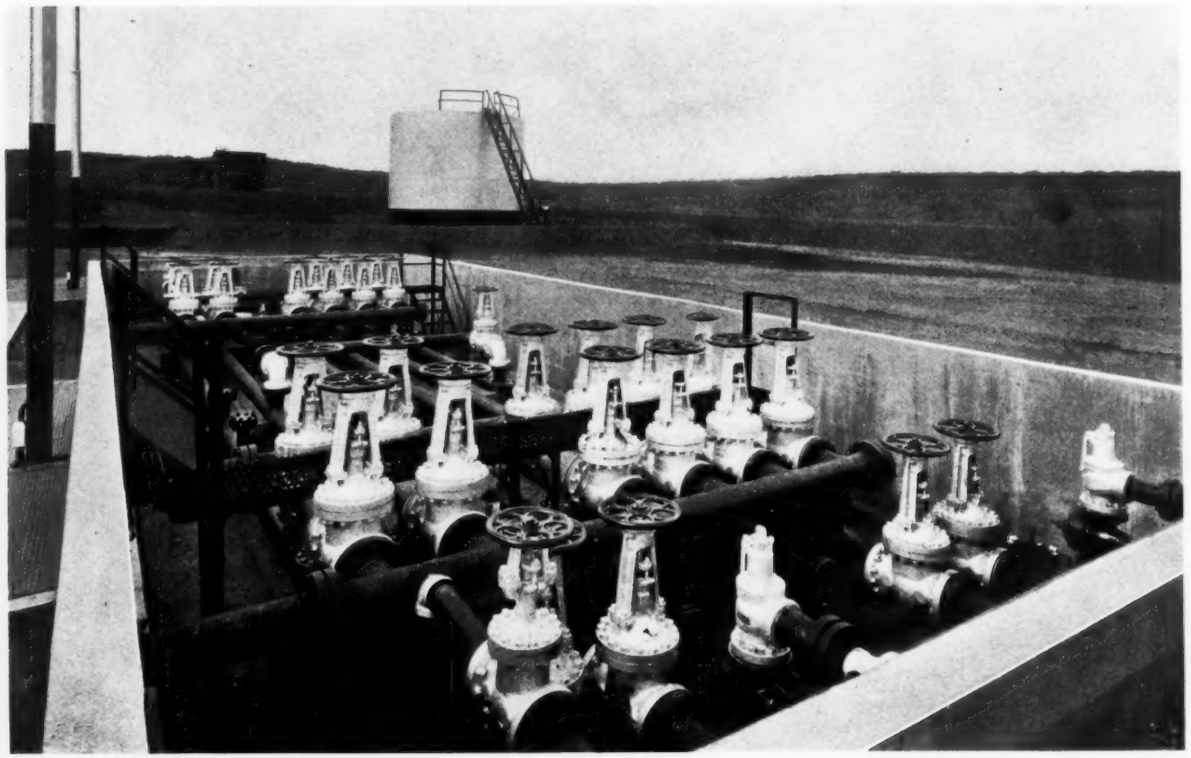
The purpose of the venture was to connect refineries in the mid-continent with distributing points in the Chicago and Great Lakes areas.

Stations and receiving points were placed at Muskogee, Oklahoma; Okmulgee, Oklahoma; West Tulsa, Oklahoma;



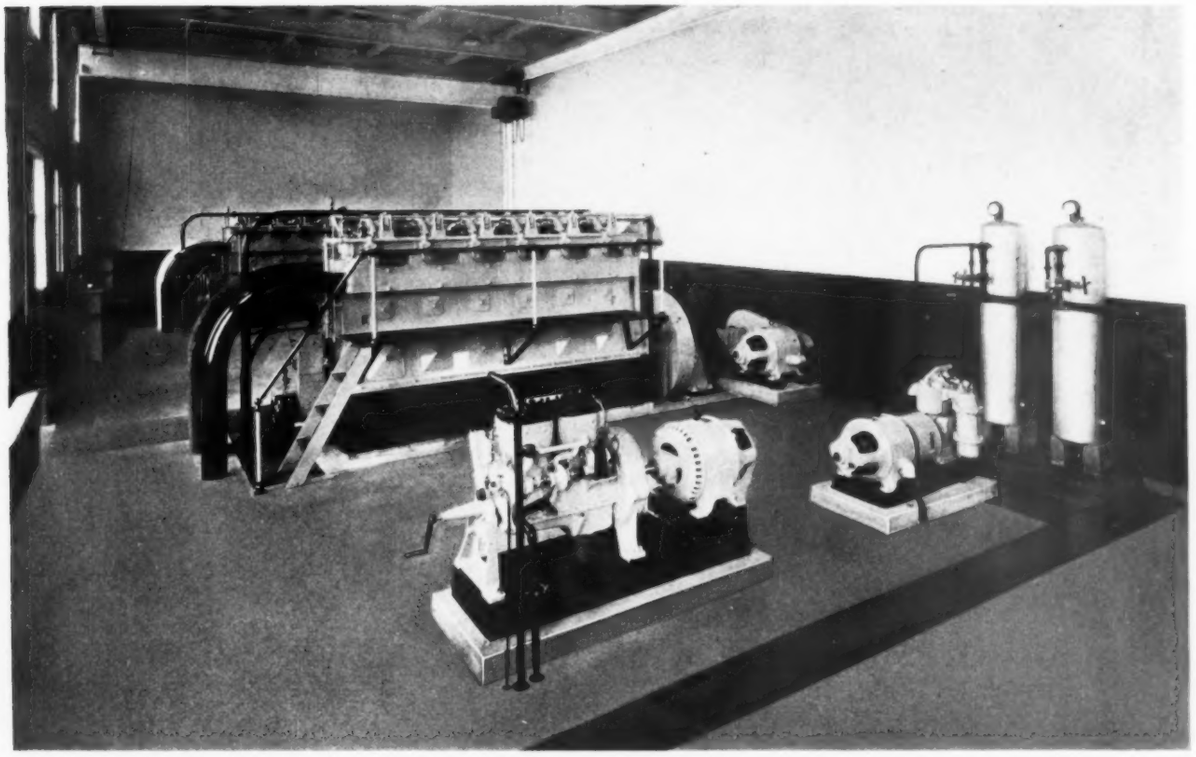
Six Cylinder Winton Diesel. Eight-Inch Line

Ponca City, Oklahoma; Barnsdall, Oklahoma, and Kansas City, Kansas. The first four points mentioned connect to the main line station at Barnsdall, Oklahoma, from where the line was constructed to Kansas City, Kansas, and thence north to Osceola, Iowa, where



Terminal Manifolds and Gates

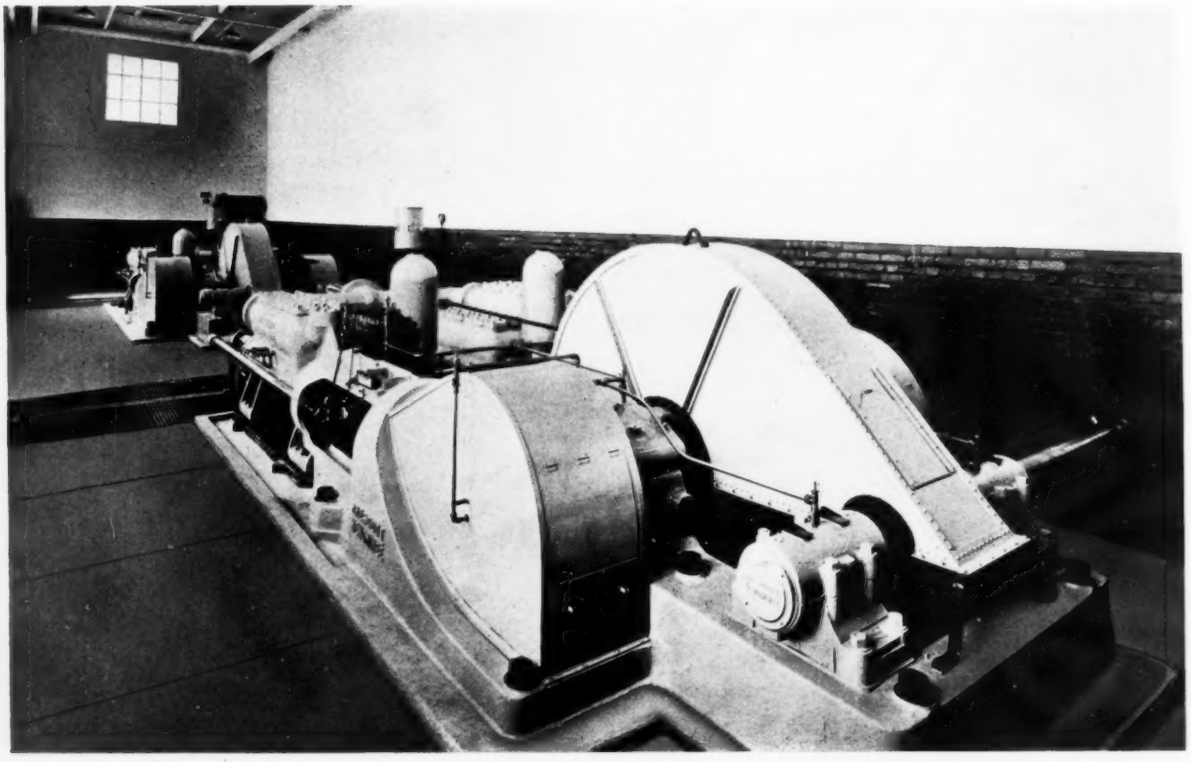
connection was made to Omaha, Nebraska; the main line continuing from Osceola, Iowa, to Des Moines, Iowa, where branch lines were built to Chicago, Illinois, and St. Paul, Minnesota, with a small connection at Iowa City, Iowa, for terminal facilities at that point.



Showing Auxiliaries

Line sizes are as follows:

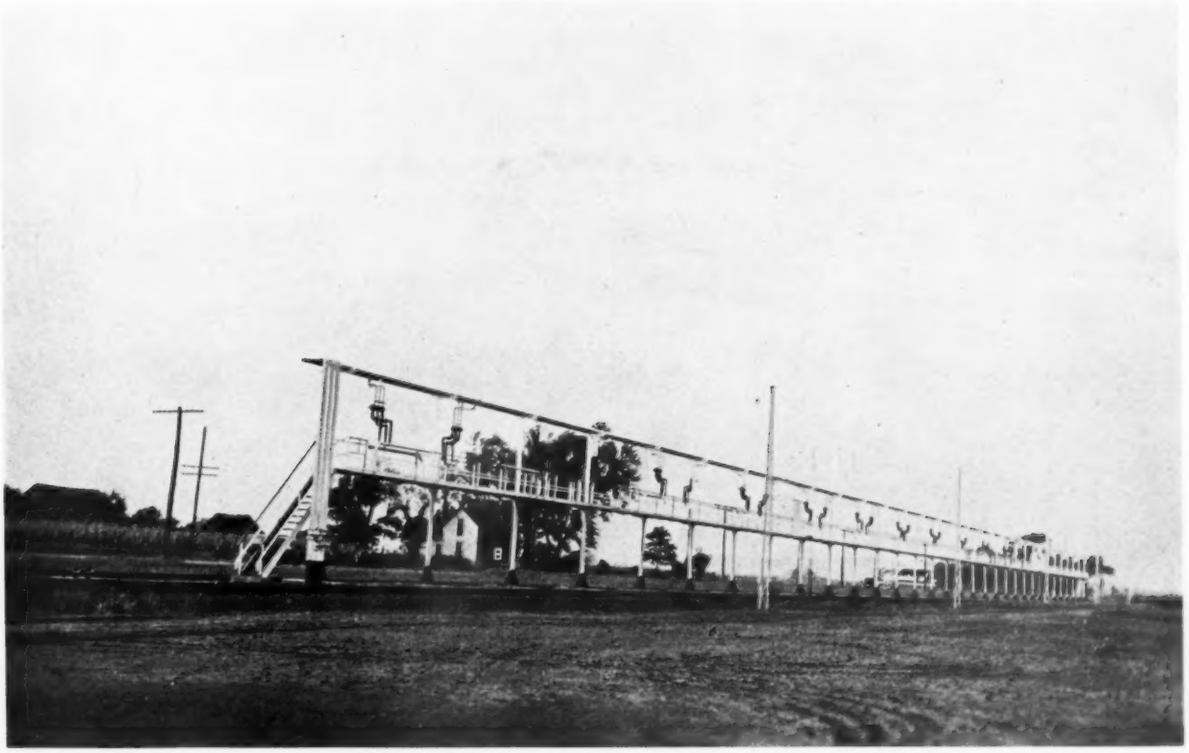
Muskogee to Okmulgee	4″
Okmulgee to Barnsdall	6″
Ponca City to Barnsdall	6″
Barnsdall to Osceola and Des Moines	8″
Osceola to Omaha	4″
Des Moines to Chicago	6″
Des Moines to St. Paul	6″



Eight-Inch Line Pump Room

The line is built entirely from seamless steel pipe, 60,000 lbs. tensile strength, and all joints are gas welded.

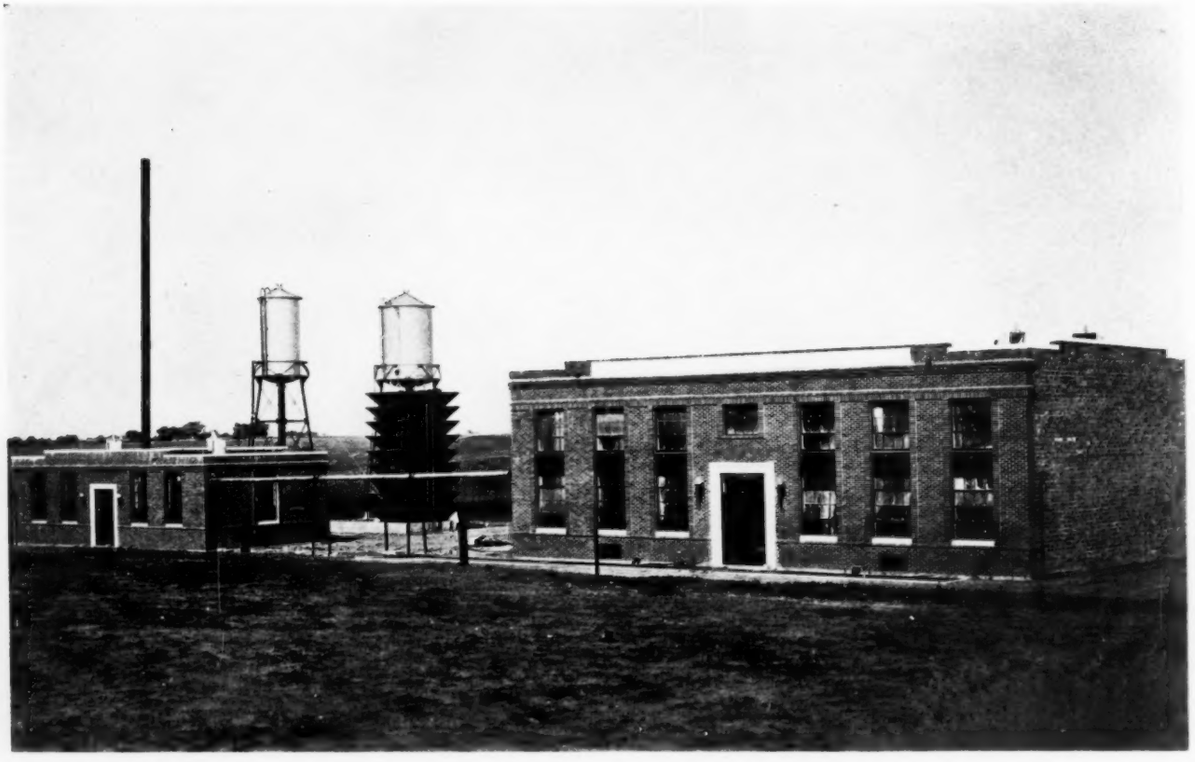
The capacity of the 8″ pipe is 25,000 barrels—6″ is 14,000 barrels—and 4″ is 4,200 barrels per day. Friction drop in all three is on the basis of 3 lbs. per



Car-Loading Rack

thousand feet of line. The line was designed and stations located on the basis of 800 lbs. working pressure.

Suction conditions at each of the stations are taken care of by surge and storage tanks, thus providing proper pump fill.



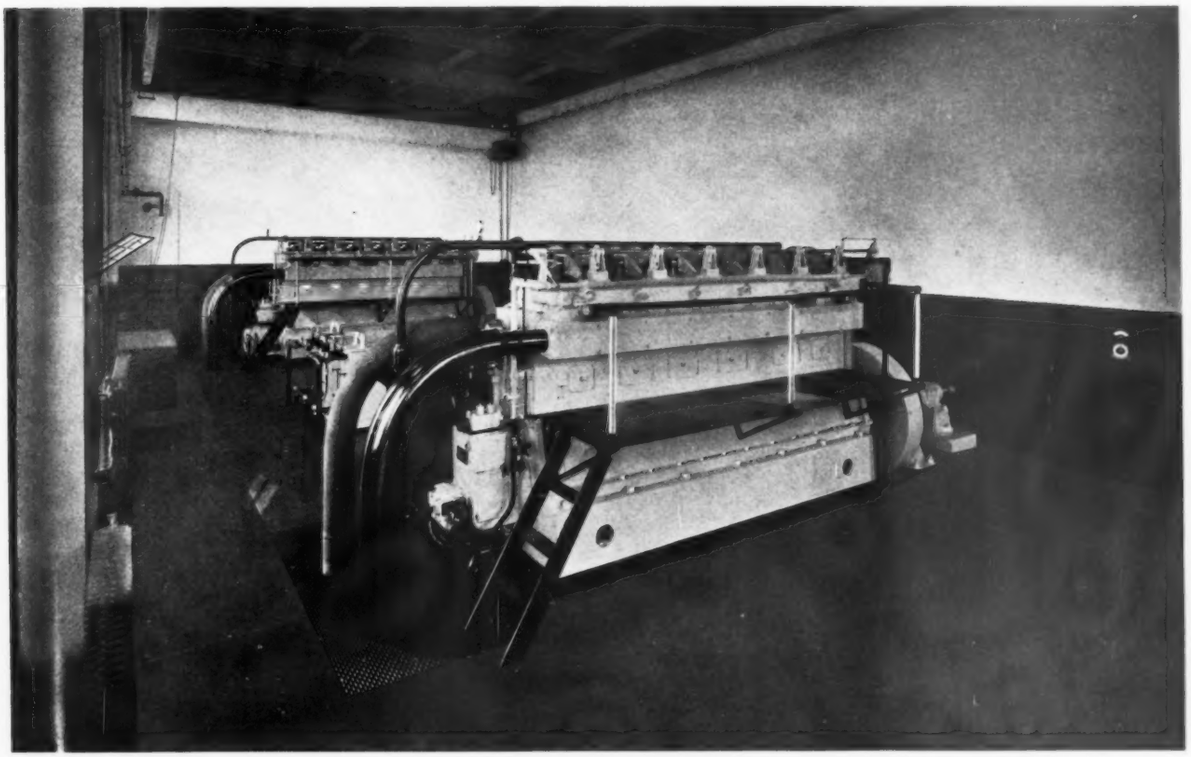
Attractive Buildings

Pumps are as follows:

On 8″—5¾ x 24″ duplex double action
On 6″—4⅝ x 18″ duplex double action
On 4″—4¼ x 12″ duplex double action

The r.p.m. varies as to the before mentioned capacities.

Pumps are packed with all metallic packing and are being operated with and



Simplicity and Cleanliness

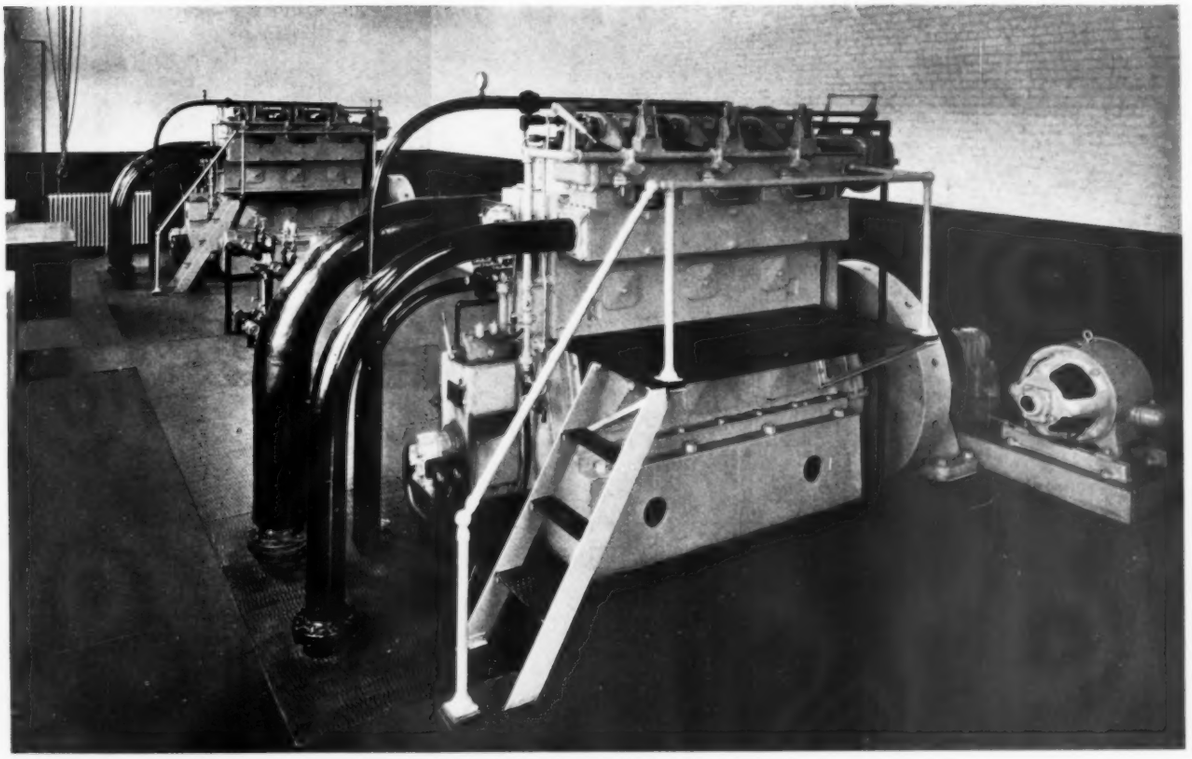
without lubrication. On 8″ line, they are connected through a fire wall to 6 cylinder 330 b.h.p. solid injection engines. On 6″ line, 3 cylinder 170 b.h.p. solid injection engines. On 4″ line, 3 cylinder 120 b. h. p. solid injection engines.

All pipe line gasoline measurements are

Fuel and Water Tower Tanks

by steel line gauges, and there are no meters used for the line. Hourly gauges are made by automatic steel line with float at each tank, and once every twenty-four hours made with hand line with corrections for temperature.

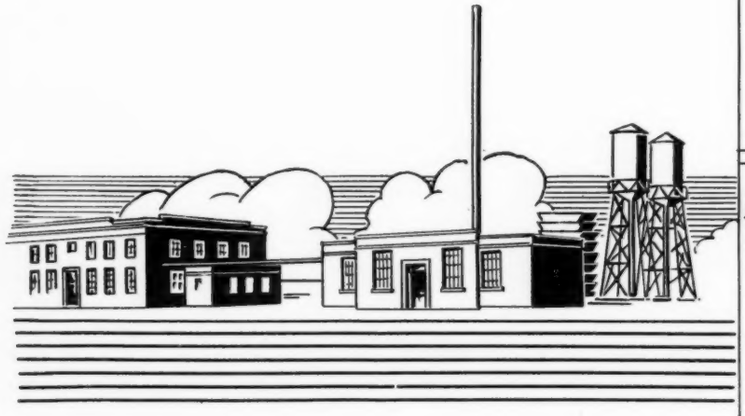
Buildings throughout the system are fireproof with fire walls and fire protection wherever necessary.

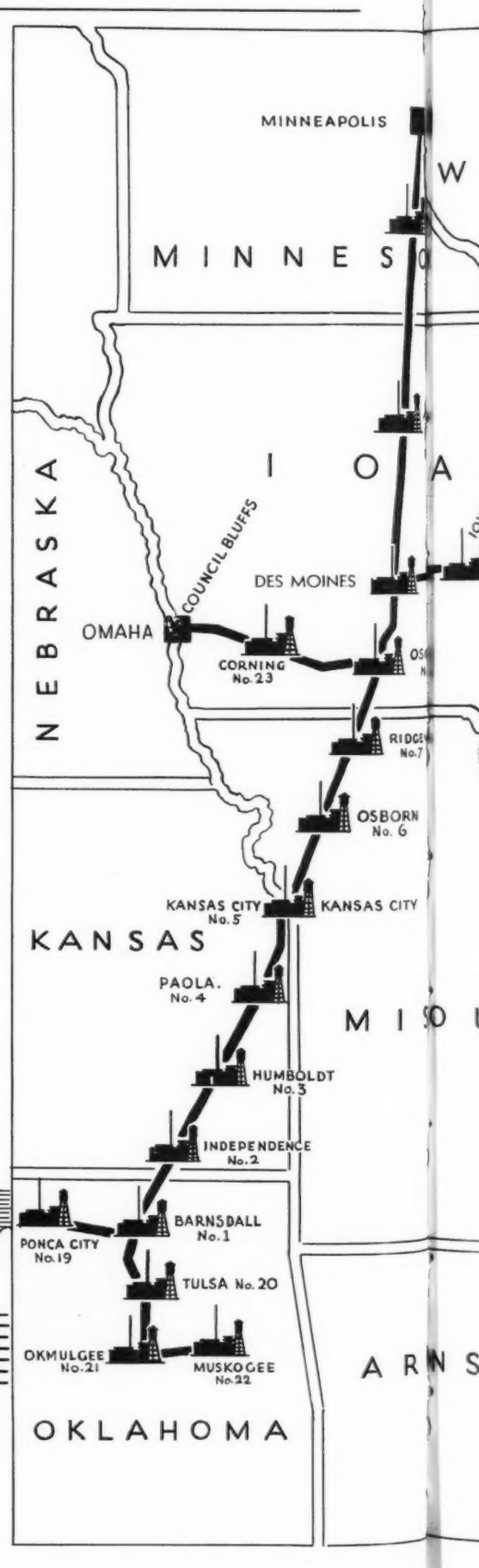


Six-Inch Line Engine Room

Lighting at the stations is provided by a DC generator on each engine driven by "V" belts from the extension shaft which connects the engines to pumps. A gasoline-driven auxiliary generator is also provided. Generators are 25 kw, 125 volt, variable speed from 600 r.p.m. to 900 r.p.m., and are connected to the switchboard on the engine room side of

GREAT LAKES PIPE LINE





The following stations are equipped with Winton Diesel Engines:

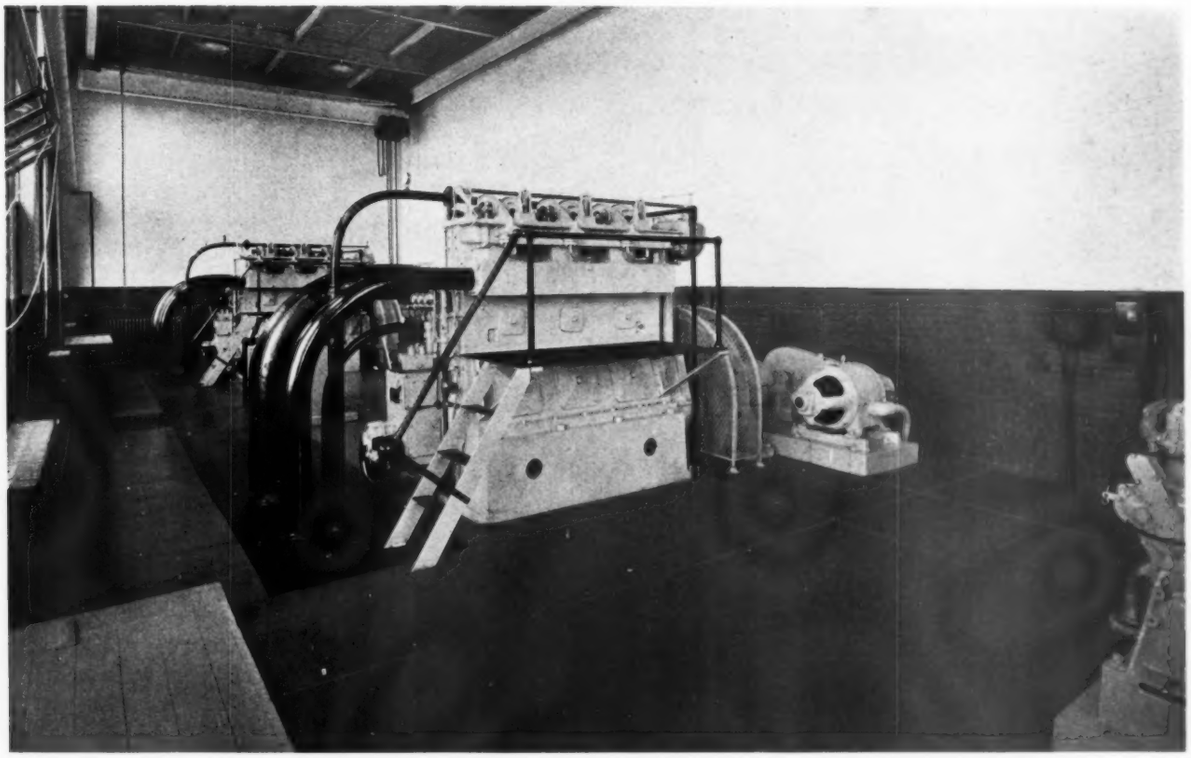
Station No.	Station	Engine Equipment
		Six-cylinder Units
1	Barnsdall, Okla.	2—330 BHP Wintons
2	Independence, Kan.	2—330 BHP "
3	Humboldt "	2—330 BHP "
4	Paola "	2—330 BHP "
5	Kansas City "	2—330 BHP "
6	Osborn Mo.	2—330 BHP "
7	Ridgeway "	2—330 BHP "
8	Osceola, Iowa	2—330 BHP "
		Three-cylinder Units
8	Osceola, Iowa	1—120 BHP Winton
10	Grinnell "	2—170 BHP Wintons
11	Iowa City "	2—170 BHP "
12	Donahue "	2—170 BHP "
13	Prophetstown, Ill.	2—170 BHP "
14	Lee "	2—170 BHP "
16	Alexander, Iowa	2—170 BHP "
18	Fairbault, Minn.	2—170 BHP "
20	Tulsa, Okla.	2—170 BHP "
21	Okmulgee "	2—170 BHP "
22	Muskogee "	1—120 BHP Winton
23	Corning, Iowa	1—120 BHP "

Advertisement

Station Showing Surge Tank in Background

the station through rheostats, and to three busses where load can be distributed to any one of the three generators.

Fuel oil is received by tank car and unloaded at switch, pumped to the station site and stored in 1000 barrel tanks, where it is pumped to a 100-barrel

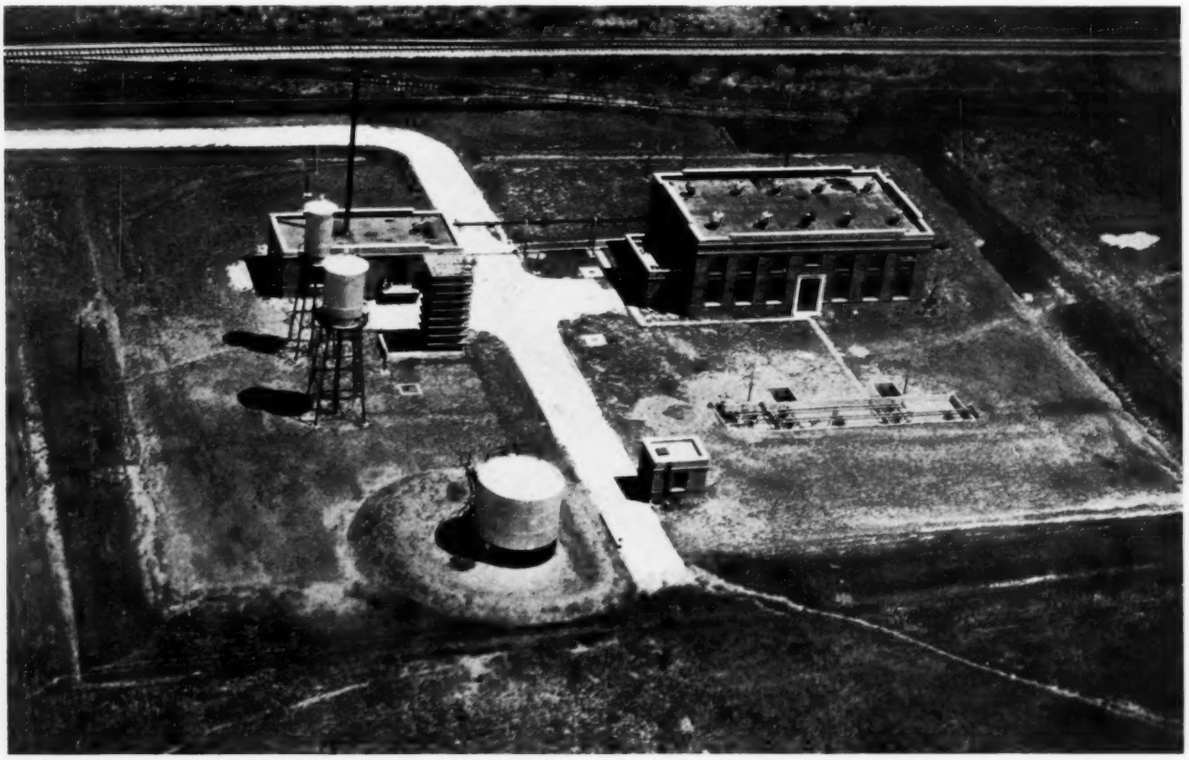


Showing Careful Attention to Details

elevated fuel tank which rides on the fuel pumps of the Diesel engines. Proper facilities for filtering and straining are provided.

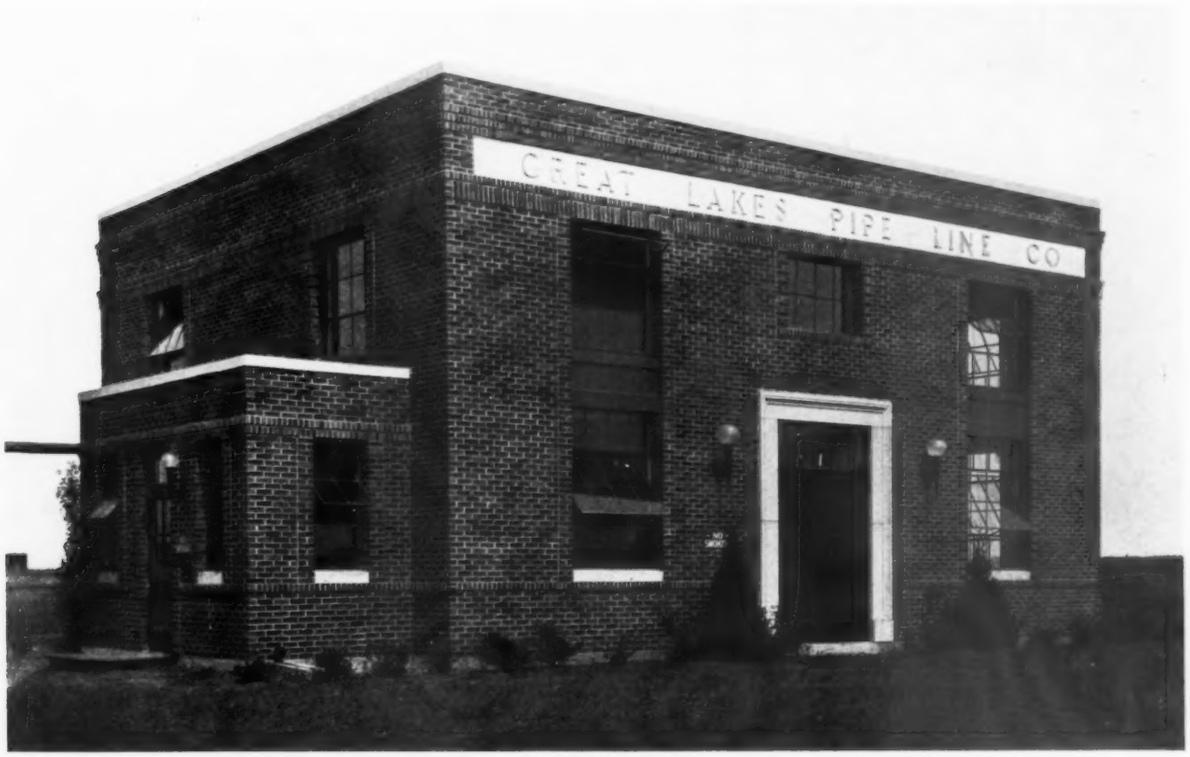
The air to the engines is cleaned through oil-type filters.

Lubricating oil over the system in all cases is an automobile-type lubricant.



Air-Plane View of Station

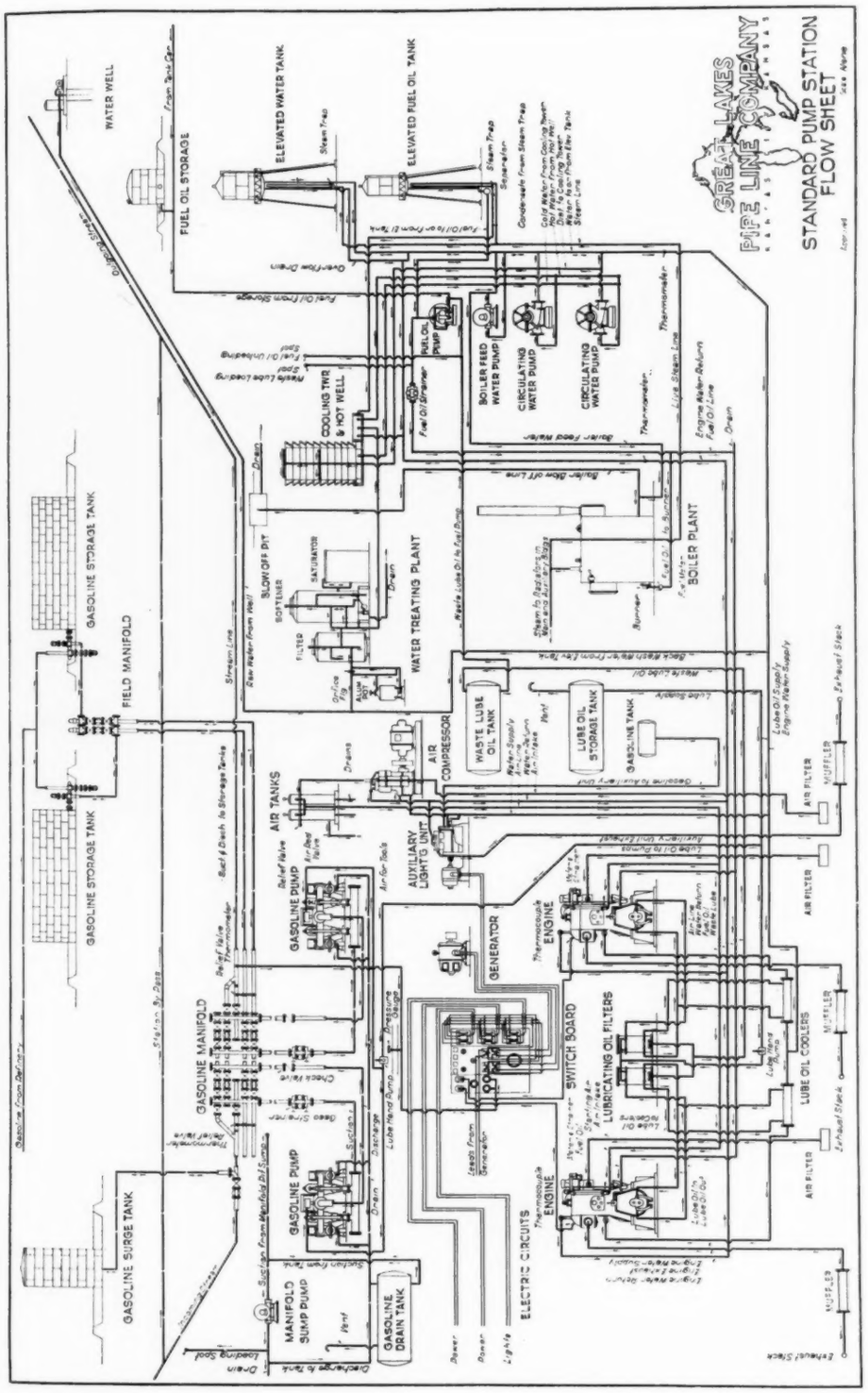
The engines and bearings of the pumps are lubricated by S.A.E. 40, and the Generators and high speed equipment by S.A.E. 20. Lubricating oil is stored in a 1000-gallon gravity tank and supplied to all points of use through a pipe and through a rotary hand pump. Oil to the engine is continuously cooled and lubricated but not centrifuged, and all

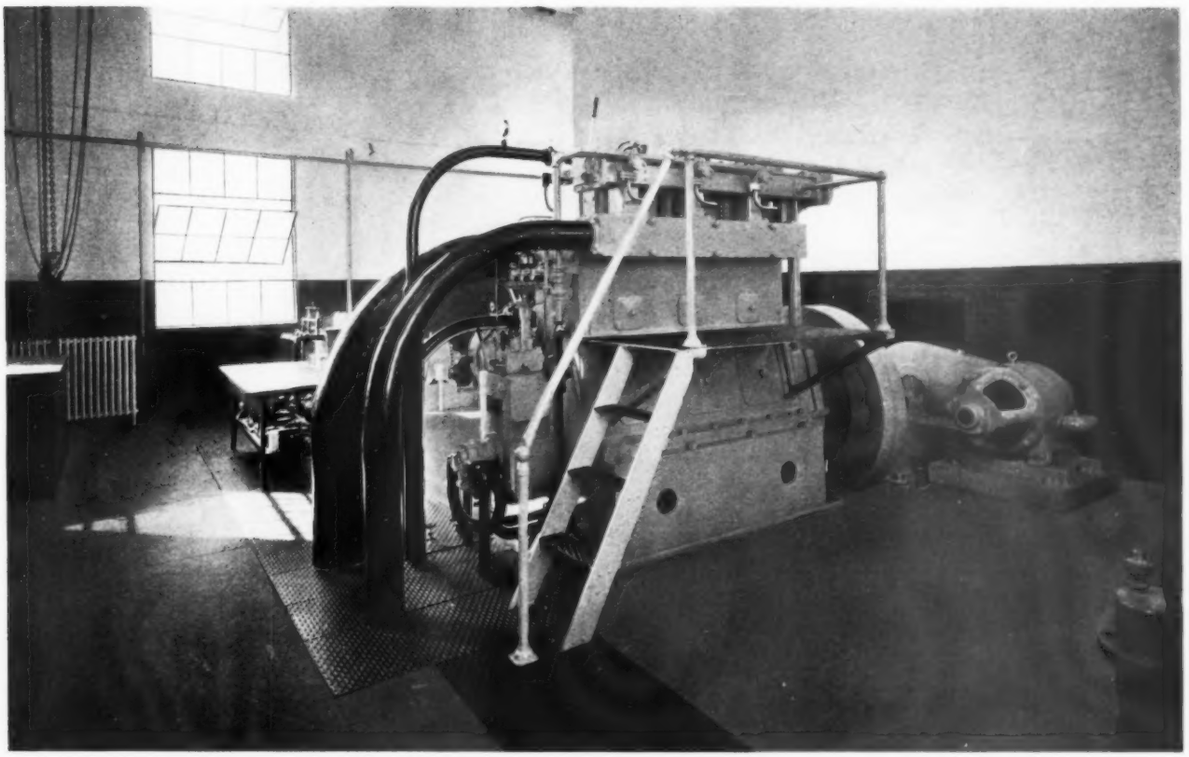


Four-Inch Line Station Building

waste oil is dropped through a pipe to a buried 1000-gallon tank from where it is picked up every sixty to ninety days and re-refined by a portable refining unit mounted on a truck, thus cutting down the overall oil consumption about two-thirds.

Water to stations is from various sources, sometimes a city supply, some-


GREAT LAKES PIPE LINE COMPANY
STANDARD PUMP STATION FLOW SHEET
WATER WELL
FUEL OIL STORAGE
ELEVATED WATER TANK
ELEVATED FUEL OIL TANK
COOLING TWR & HOT WELL
BOILER FEED WATER PUMP
CIRCULATING WATER PUMP
BOILER PLANT
WATER TREATING PLANT
GASOLINE STORAGE TANK
FIELD MANIFOLD
AIR TANKS
AIR COMPRESSOR
WASTE LUBE OIL TANK
LUBE OIL STORAGE TANK
GASOLINE TANK
AUXILIARY LIGHTS UNIT
GENERATOR
ENGINE
SWITCH BOARD
LUBRICATING OIL FILTERS
LUBE OIL COOLERS
GASOLINE MANIFOLD
GASOLINE PUMP
GASOLINE SURGE TANK
MANIFOLD SUMP PUMP
GASOLINE DRAIN TANK
ELECTRIC CIRCUITS
AIR FILTER
MUFFLER



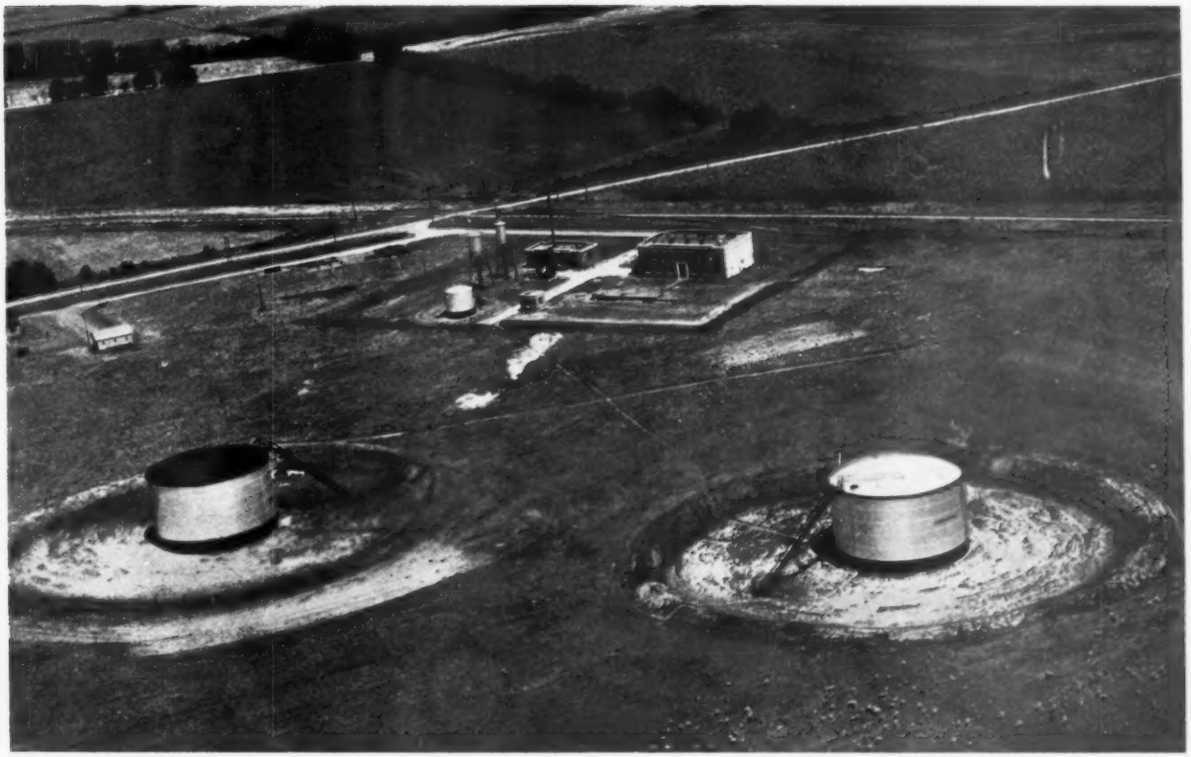
Four-Inch Line Engine Room

times a well, and sometimes a surface reservoir. In all cases, water is filtered, and treated to two or three grains hard. Water is continuously used by means of cooling over an open type tower, going from hot well to cooling tower to an elevated 200-barrel storage tank that furnishes pressure and quantity to the Diesel engines.

Air-Plane View of Tanks

Air is compressed in an auxiliary air compressor for starting pressure and for tools about the plant. This compressor is a two-stage water-jacketed compressor having a continuous capacity of 12 cu. ft. at 300 lbs.

A five ton crane is provided on the engine room side of the station, and a two ton on the pump room side.



Air-Plane View of Station and Tankage

All auxiliary uses of oil and gasoline about the plant are measured by meters. Pyrometers are provided for the exhaust temperatures of the Diesel engines, indicating and recording gauges for all pumping lines, and temperature indicating gauges are placed where necessary for full operating data.

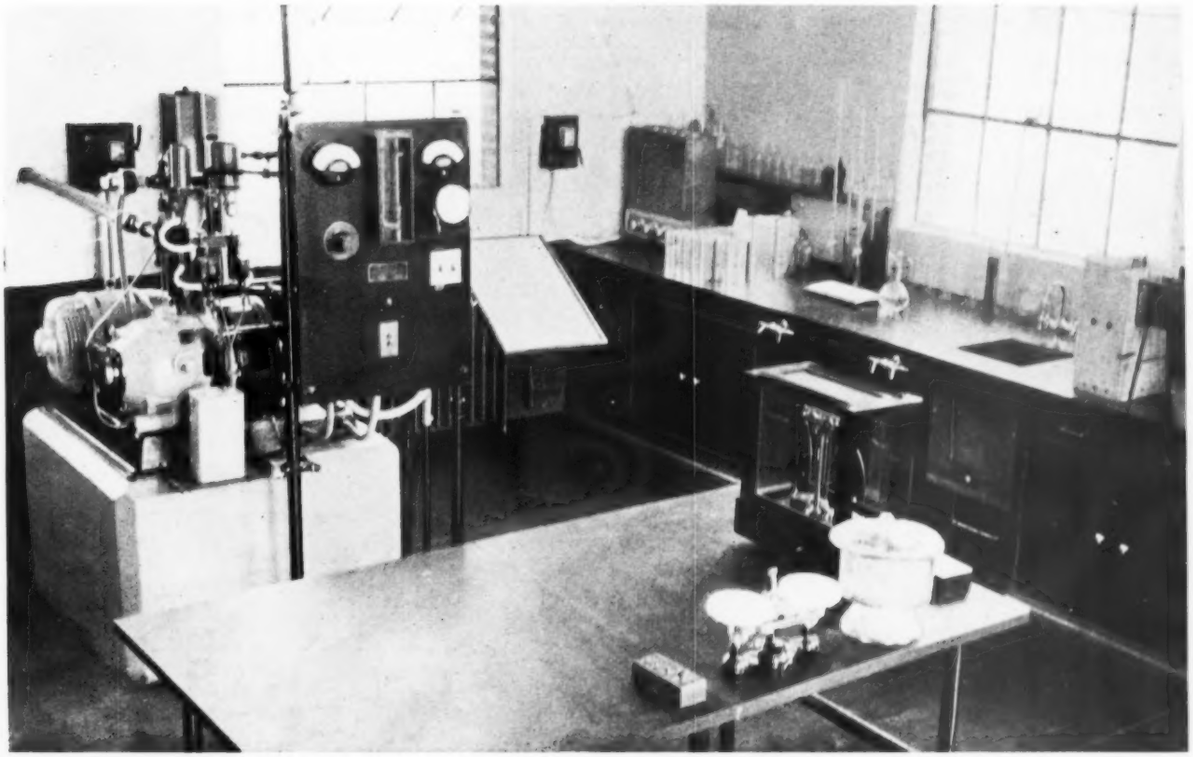
The plant is operated entirely by one

Tank Car Tracks and Loading Rack

engineer per eight-hour shift except at locations where gathering takes place, such as Muskogee, Okmulgee, West Tulsa, Ponca City, Bransdall, and Kansas City.

All heating about stations and auxiliary buildings is by means of a 15 lb. welded steel pressure boiler, capacity 26 H.P.

Terminal facilities are at places prev-



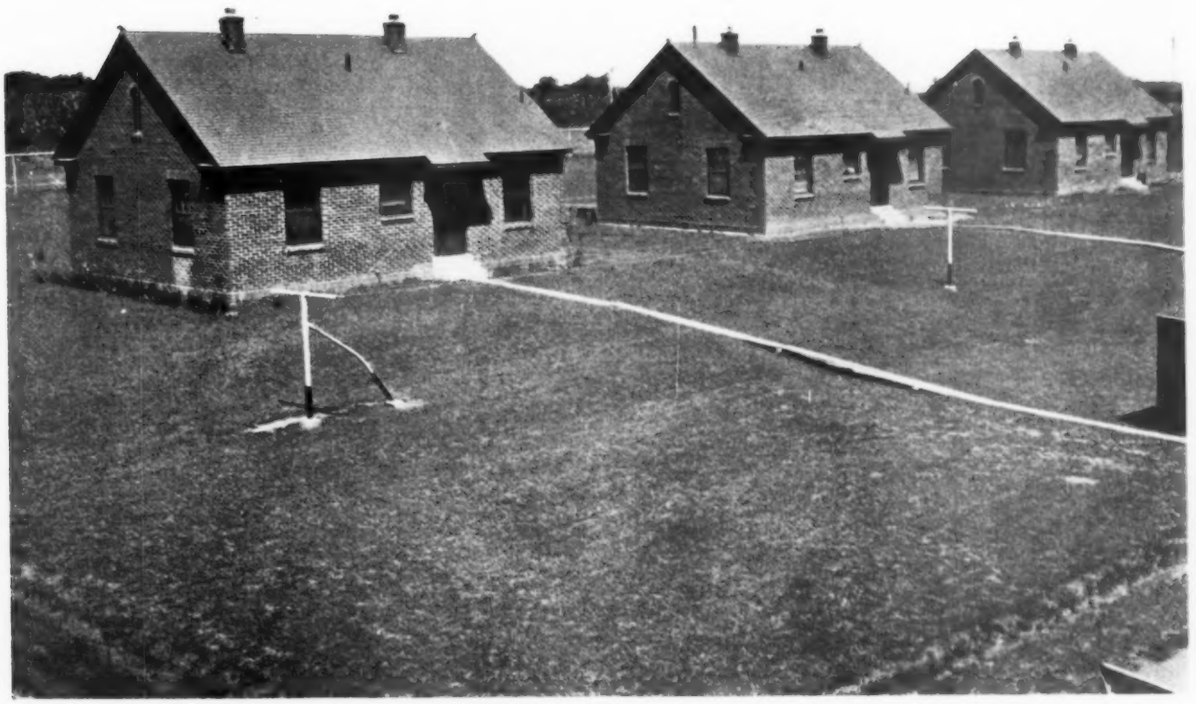
Laboratory

iously noted and consist of loading racks of sufficient length to take care of line capacity at one spotting of cars, with a separate line and pump for each product loaded, and there is a laboratory in connection with all terminals where the proper tests are made on the gasoline shipped. There is also provided a tank car Ethyl blending plant, where under

Car-Loading Rack

the supervision of the Ethyl Corporation, Ethyl blending of gasoline takes place.

Dispatching over the entire system is by means of telephone over Great Lakes Pipe Line Company's privately owned telephone line, and Dispatcher is in direct communication through selective ringing to every point over the entire



Employes' Cottages

system, and receives hourly gauges from each station. In addition to telephone facilities, there is provided teletype facilities with all terminals and all receiving points, so that shipments can be immediately reported to headquarters and forwarded to the companies using the facilities of the pipe line.

Tractor hauling engine to station site.

Engine loaded for transport from railroad cars to site of pump station.

All of the Winton-Diesel Engines, fully assembled, except fly-wheels, were transported by truck from railroad cars to station sites.

Portable drum hoist used in loading and unloading engines.

Engines unloaded at station site before construction of buildings.